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Long Range Economy.

Any attempt to make a detailed analysis of the connection between the material aspect of an investment in plant and its relation to the business side of a telephone company's operation involves the carrying on of a very complicated investigation. The principal reason for this is that the rate of development has been so variable, and, at all periods, usually so much greater than anticipated, that all calculations had to be readjusted at frequent intervals. Men who have forecasted the future have seen the fact turn out so far different from their anticipations that many have been led to the conclusion that the course of real economy is to take care of the requirements for plant only as fast as they arise. It may be true that in some parts of the country, where colonization projects are going on, this is the best policy. But broadly speaking, it leads to a waste both of material and labor, and so of money. There is a constantly growing appreciation of the necessity of figuring on the installation of a plant which will provide for the lowest total outlay, including the original investment, interest upon it, maintenance and depreciation, during the entire useful life of the equipment,

A company which keeps its records properly can figure the future items with a much greater degree of accuracy than was possible even two or three years ago. A determination of unit costs, and interchange of information makes it possible to figure on the future as well as the present maintenance expense. Equipment has not changed so much that a man is unable to find out from his neighbors who have seen it in service for some years what ratio obtains between the maintenance expense on old apparatus and on the same equipment when newly installed.

Data relating to depreciation are now available to any man who has kept reasonably well classified records; and, under the same conditions, it is much easier to anticipate both the extent and direction of growth that it was a few years ago. With this knowledge at his command an exchange manager can at least make a "scientific guess" at the requirements for a period of five or ten years ahead. This enables him to figure whether the interest and depreciation on the excess above immediate requirements involved in the provision of a more ample type of construction will be wasteful or not. In cases where analysis shows that there is economy in building ahead, as there cer-

tainly is in the majority of cases, the practice of building too small for the anticipated demands can only be characterized as extravagant and wasteful. The fact that the replacement of the waste comes in the future rather than at the present is no mitigation of the offense. The secret of success in the telephone business, apart from the question of maintaining a high grade organization, and the sustenance of cordial relations with the public, depends upon the accuracy of planning for the future, and the activity exerted in obtaining funds to build for ultimate economy. This policy of building intelligently for greatest economy over the total life of equipment will always succeed, and is contrasted favorably with that of waiting for the demand to arise, then skimping the plant in order to save the money getting end of the organization from a little necessary exertion.

The Advance of Railway Telephony.

The sharp rise of the curve denoting the extension of telephone service throughout the United States, year by year, is one of the strongest indications of the essential value of this method of communication. But rapid as has been the growth in the use of the telephone there is no special division of this use which has made any such remarkably sudden growth as is evidenced in the case of railway telephony. Less than two years ago the subject of dispatching trains by telephone was, it is true, not infrequently discussed; but no sooner was it mentioned among railway men than the signal was given for a series of attacks, usually based, it must be admitted, very largely on creations of an over-anxious imagination. Still the general opinion was one of distrust, however lacking were real grounds established by actual experience. Under these circumstances the announcement that the Burlington road was using the telephone for dispatching created something of a sensation in telephone circles where the feeling of railroad men was known, and aroused what was truly a commotion among the railway men themselves. Since Mr. Ryder had the courage to make the pioneer effort the progress of the telephone has been rapid. Traffic over many thousand miles of track is now controlled by men using this instrument. The Burlington road has even gone so far as to entirely throw out its telegraph facilities along a considerable mileage and, relying absolutely upon the telephone, has no reason to regret its confidence. Incidental uses not foreseen have cropped up from time to time to strengthen the feeling of cordiality toward the newcomer in the field of railway operating equipment. The use of special telephone facilities for carrying on the business of the road, which has already been so well developed by the New York Central Lines, and the Pennsylvania system, may be expected to spread rapidly along with the extension of telephone dispatching.

It is true that the railroads have found the telephone presenting problems demanding very careful thought and thorough investigation, and that they are still at work upon some of the most important questions which have arisen. Yet, in a broad sense, the telephone has demonstrated its great superiority over the telegraph. So conclusive is the evidence in its favor that the executive officials of roads have appropriated money for its extension at a time when expenditures were supposed to be so reduced as to cover nothing more than absolute necessities. Not only this, but all operating officials and employees have been practically unanimous in their endorsement, the telegraph operators themselves numbering some of the most enthusiastic advocates of telephone dispatching after using the new system and giving it a thorough tryout.

A Prize Puzzle from Indiana.

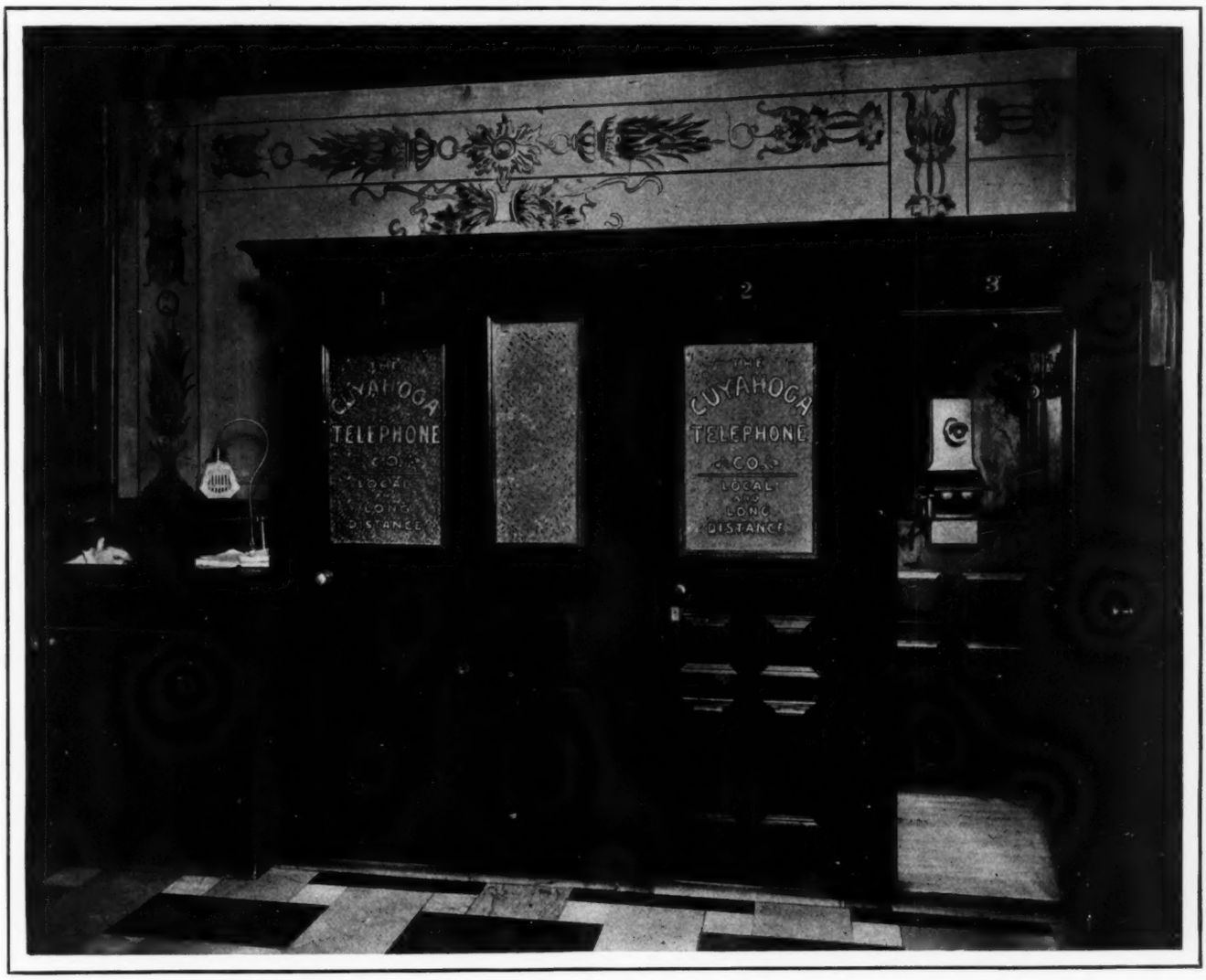
A correspondent has made some discoveries by comparison of the Indiana State reports of telephone valuations for the years 1909 and 1908. The situation revealed is interesting. People want to know how the Central Union Telephone Company has lost $600,000. As is well known, the Indiana assessment laws of 1907 place the duty of reporting the value of their properties upon the telephone companies. From some parts of the country we have heard rumors that telephone officials are unable to form rigid ideas of the values of the properties under their control. There seems to be some occult influence which operates on the minds to increase their estimate of the value of the property when going before the public to secure a raise in rates, for example; while at another time, when they are going before the representatives of the public to explain what the true and just assessment value of their property should be, they forget their first figures, lose all the old memoranda, and work up a new analysis in which they are far more modest in their claims. But it cannot be that we have such a case here, because we are dealing with the Central Union company. This company may be relied upon to be honest. We have its own published guarantee of its honesty. So, depend upon it, if the company reported to the tax board that it lost $600,000 during this last year, it actually is just that much "in a hole."

President Vail's reports show that the associated Bell properties appreciated in value something like $25,000,000 last year, so the Central Union condition is extraordinary. Is it possible that the weak child has been thrown into the water to learn to swim, and is floundering? The Central Union company's great claim for distinction, according to some authorities, is its overwhelming indebtedness. How long can it remain in business if its properties, which secure this indebtedness, deteriorate at the rate of $600,000 a year? Is it any wonder the public supports the local competitors, whose properties show a normal, healthy condition? However, we hope that sometime this company will see a great light. Instead of keeping some of its most able men working at high pressure attending to the business of its competitors, it may put them to work on the property represented by its outstanding securities. They could increase its value if they put their minds to it, and then we should have one less example of the financial dangers which make investment in a poorly managed telephone company a serious hazard and a general reflection on the industry.

Ventilation and Lighting of Telephone Booths

By S. D. Levings

When considering an expenditure that is not an absolute necessity, the first question which generally arises, relates to the return, which may be reaped, either directly or otherwise, as a result of such expenditure. Good ventilation and lighting in public conveyances, theatres, halls, etc., are demanded by the public, and as a result of this demand, an expenditure is forced to meet the requirements. With respect to the public telephone booth, it is true that the public as yet, has not gone so far as to demand these provide more than the necessities, i. e., comfort, for their patrons. It is surely true that many things in this daily existence unconsciously impress themselves upon our minds, but lie dormant until called into activity. In this way, comforts provided for the public, however insignificant, impress the minds of those affected, and, as a result, the company or corporation is benefited by their moral, as well as by their financial support. It would seem then, that any expenditure toward booth ventilation and light-



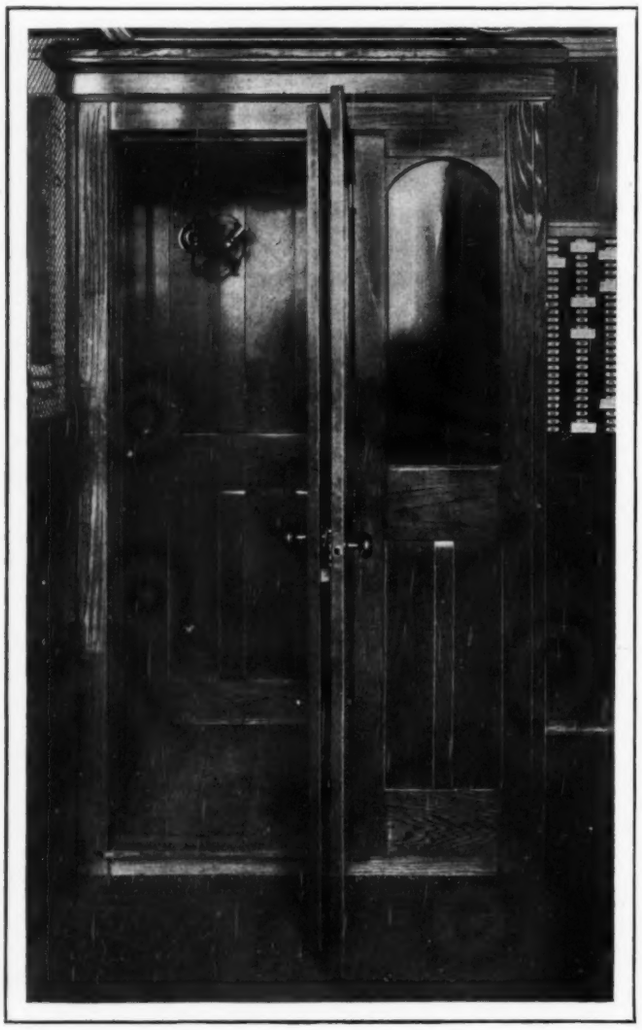
Battery of Ventilated Booths which Exemplifies the Principle of Looking Out for the Comfort of Prospective Telephone Users.

features, but in the present state of legislation, the time may not be far off when the legislative eye will be turned toward the telephone booth, and operating companies forced to provide these features, the lack of which in some cases has aroused public sentiment.

There is a more pleasant thought than this, however, namely, that the telephone companies, of their own good and free will, are providing these necessities, from a desire to please their patrons and to furnish the best possible service and equipment. Many companies which have at the present time the latest improvements in this line have recognized the fact that to gain in public esteem they must ing, will be sure of bringing in returns, of one sort or another.

There are two phases to be considered, in booth ventilation and lighting, the most important of which is the sanitary advantage to be gained. It is a problem which involves public health, and cannct therefore be shouted into insignificance. It is impossible to admit to the public booths only those who have a clean bill of health, and this explains why precautions should be taken to insure good ventilation. The precaution taken in public conveyances of all classes, to guard against the transmission of contagious disease, is evidence of the general trend toward

sanitary conditions. No class of public conveyance or gathering place contains so limited an amount of air per capita as the telephone booth. In the former, much more ample means, both natural and otherwise are at hand for relieving the unsanitary conditions than are present in the telephone booth, and this points again to the fact that



Fan Supported Above and Behind the Position Taken by the Telephone User.

special sanitary measures are needful in the case of the booth.

The other phase of the matter, and one on which the return from the expenditure is expected, is the comfort afforded patrons of public booths through the provision of proper ventilation and light. This is not of such great importance as the former, especially when viewed in the light of ethics, but it is the duty of a public service corporation to provide all the comforts possible, which lie within reason, if for no other cause than one of a desire to be popular. It is reasonable, therefore, considering the foregoing, to assume that ventilation for public telephone booths is at the present time a necessity.

The question of proper light needs no elucidation. We do not naturally live in the dark, and it would seem unreasonable to expect us to telephone in the dark, when ample means are always at hand for providing light.

There seems to be but one method of obtaining proper ventilation in the present type of telephone booth, and it is by means of the electric fan. Where electricity is not available, conditions must be borne as they are found. The fundamental cause for booth design was the desire to obtain as nearly a sound-proof enclosure as possible. For ordinary conversations within a radius of a few miles beyond the exchange limits, no booth is necessary, except in railroad stations and like places. But for long-distance telephony, the sound-proof feature becomes a necessity, as all foreign noises must be eliminated to get the transmission effect necessary on very long lines. Another consideration upon which may rest part of the responsibility of present booth design is the effort to provide an enclosure that will afford privacy to the individual telephoning, but, as before stated, transmission is primarily the cause for the sound-proof feature.

Any means which may be taken to provide ventilation from outside sources will at the same time provide a means of entrance for outside noise disturbances, and the purpose of the booth is therefore not realized. The frequent opening and closing of the door possibly permits of an entire change of air, but this air is devitalized by the occupant during the time he is in conversation or waiting for connections. It is not feasible to so construct the booth door as to make it air tight as well as sound proof, and as a result air may be forced out of the booth by means of the fan motor, through the crevices surrounding the door. This exhaustion process tends to create a vacuum, and fresh air will be sucked in, through the same channels. Again, a sufficient number of very small holes may be bored in the roof of the booth, which under ordinary conditions would not provide a sufficient amount of air, but which by the process of exhaustion will be ample. These holes can be of such size, number and location as to exclude all outside noises that can be detected by the ear. From a physical standpoint, it seems feasible to assume that proper ventilation may be obtained in the present type of booth by the installation of a proper motor fan. For obvious reasons, previously stated, no other method can be resorted to, which will approach the same results while at the same time maintaining the features which the booth is intended to secure.

There are usually two theories advanced, which are intended to discourage the use of the electrically driven fan for ventilation purposes. First, it is assumed that the noise thus introduced inside the booth will be fully as objectionable as that from outside sources, and second, that it requires the constant supervision of the operator, when adjacent to switchboards, to control the fans in order to make the current consumption a reasonable charge. The first objection might have held good some years ago, but the constant increase in efficiency of design for small motors has made it today an almost noiseless machine. The noise of the fan blades whirring in the air will always be present, but in the sizes necessary this is so slight as to be entirely negligible. The elimination of motor noise apart from that produced by the fan blades is dependent as much on the manner in which the motor is mounted in the booth as upon its design. The common laws governing sound and its transmission other than electrically, are known to all, and it is a well known fact that a sounding board may be readily produced by the use of a wood table top, wall, floor, etc. Now, if the fan motor were to be mounted directly and rigidly upon the wall of the booth, the resonant effect produced by the wall, which would assume the function of a sounding board, would assume such proportions, with even the most quiet motors, as to be highly objectionable. Therefore some other means must be designed to furnish a non-resonant support.

A common practice, and one which has given extremely satisfactory results, is to suspend the motor from a bracket secured rigidly to the walls, by means of wire springs. These springs are specially wound, so that their resili-

ency will be such as to allow the motor free suspension. It has been found that these springs will take up most of the vibration which is the cause of the objectionable noise, and render the motor silent except for the wind noise previously mentioned. These brackets and springs are proprietary articles, and may be purchased on the market.

The question of proper control for lights and fan motors is determined, generally, by the use for which the booth is intended, and its location. Two cases must always be considered. First, where a booth may be isolated from a P. B. X. or toll monitor's desk, and which is a calling station; second, where the booth is situated adjacent to and supervised by a P. B. X., or toll operator, and is always a called station, and never a calling one. These two conditions condensed and coupled to the question of control, may be stated as follows: Where a booth is so located as to be without supervision by an operator, automatic control must be furnished. Where a booth is so located as to be within the supervision of an operator, automatic or auto-manual control may be supplied.

Automatic control for isolated booths may be best furnished by the installation of a door switch. The general features of such a switch are these:

A plunger is so held in place by a spring that when the booth door is open it is disengaged from between the contact springs, the plunger protruding beyond the face of the door casing. When the door is closed, the plunger is

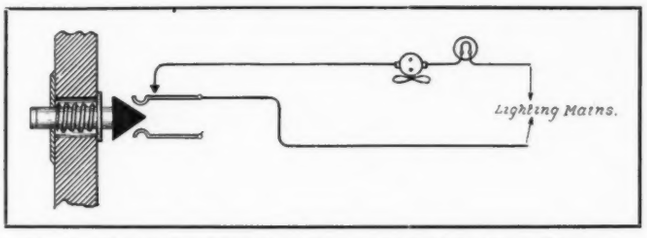


Fig. 1—Circuit for Operating Fan and Light by Door Plunger.

forced in, closes the contact springs, and thus completes the circuit to which is connected the incandescent light and fan motor. This switch is usually installed serially in the circuit. It also is a proprietary article, and many types may be purchased at the supply houses. Fig. 1 shows the circuit involved in an installation of this kind, and it is seen that the closing of the door, with such an arrangement, automatically turns on the fan and light, which remain on until the door is again opened. The current is normally on only when the door is closed, and the door is normally closed only when the booth has an occupant. All wiring should be in accordance with standard electric light specifications, and the plunger switch should be of a type approved by the Board of Underwriters.

There are two methods for the remaining cases, one of which is operated entirely manually, and the other of which is part manual and part automatic in its operation. The most common manually operated method is provided for by the installation of cam keys in the switchboard or desk, one key for each booth. This key is made to operate a relay, which in turn closes the lighting circuit. Fig. 2 shows a circuit for such an arrangement. An ordinary relay having a movable armature capable of serially closing a circuit is used. The current to operate this relay is obtained from the local battery if one is present, and if not, from the battery pair. It is preferable that the relay be mounted in or on top of the booth, to reduce the amount of electric light wiring to a minimum. All wiring should be done in accordance with standard specifications.

The operation of the arrangement just described is as follows: It is general to arrange for direct orders from the public to the toll operator, or P. B. X. operator, who is located in a public place. The operator orders the connection up, and during the time the subscriber is waiting for the connection, he is not in the booth, but in the reception room which should be equipped with suitable

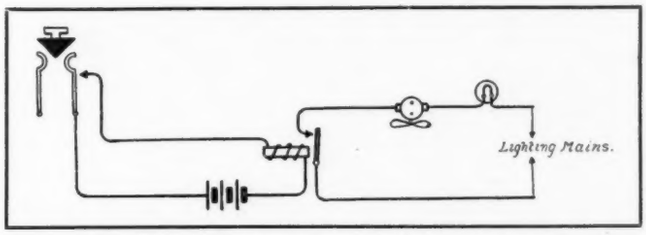
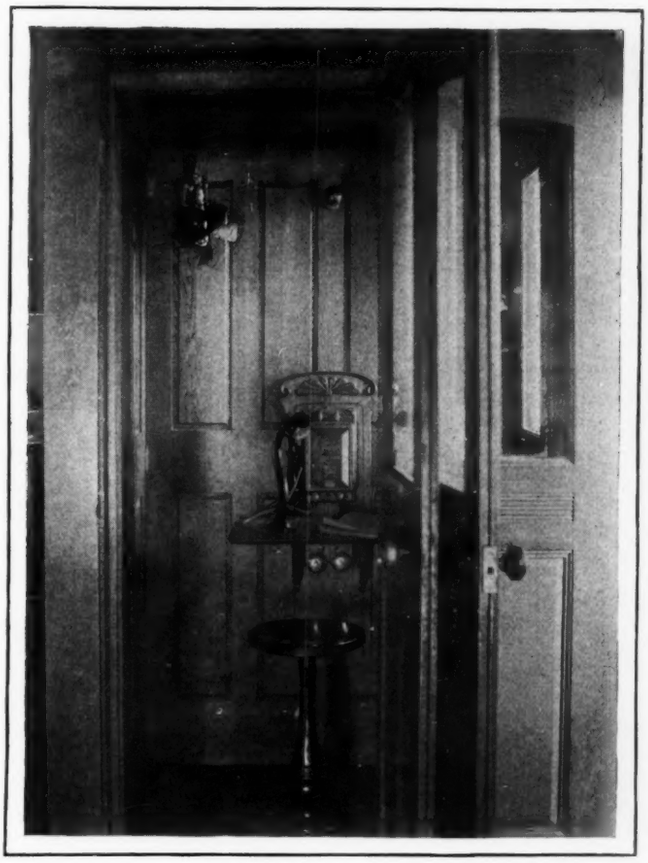


Fig. 2—Connection for Manually Operated Control of Fan and Light.

furniture for comfort. When the connection is up, the operator notifies him, and assigns him a booth, at the same time inserting her calling cord plug, and throwing the cam key. This puts the booth instrument in circuit and turns on light and fan. When the conversation is ended, and the party out of the booth, the cord is taken down and the cam key restored. If operators are properly



Good Arrangement of Fan Where Telephone Is at the Back of Booth.

trained, great economy may be obtained by the use of this method.

The remaining method of control, properly called auto-manual control, where the booths are supervised by the operator, is possibly preferable, as it eliminates one operation on the part of the operator. Fig. 3 shows the circuit for such auto-manual control. An ordinary cut-off jack is used, and modified by the addition of two springs shown at *A* and *B*. A circuit from the local battery or

exchange battery pair connected to the springs thus added contains a relay, as described for manual operation. This modified jack is mounted in its usual position in the panel, or desk, and is to be considered as a calling jack only. When modifying jacks in use, calling jacks only should be taken for this purpose. The telephones in the booths should be reconnected to the jacks in the former positions.

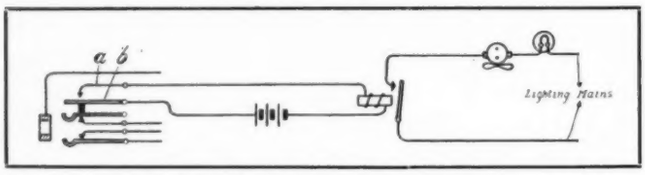


Fig. 3—Cut-Off Jack Modified to Control Booth Fan and Light.

The operation of this scheme is as follows: The jack serves two purposes by the action of the operator inserting the calling plug, when a connection is up; it connects the booth telephone in circuit, and closes the local circuit, thus energizing the relay. The relay draws up its armature, which closes the lighting circuit, turning on the light and fan in the booth. The relay should be located in the same position as in the previous case, and for the same reasons. The wiring should be carried out in accordance with standard specifications. This latter method eliminates the purchase of additional apparatus, as old jack springs may be used. It also eliminates the necessity of mutilating the switchboard or desk for the reception of cam keys, and is easier of adaptation in other general particulars. As before stated it reduces the work of the operator by one operation, and is probably more economical. It is rare that an operator does not take the cord down when a conversation is finished, and with this arrangement the current for lighting and ventilation is sure to be cut off at the proper time. It is possible to conceive of negligence on the operator's part, in the case of manual operation, resulting in the failure to throw the cam key into the "off" position.

There are other ways of regulating the lighting circuit, which have been installed in various places, but those here described seem to have gained the widest recognition as being well adapted to serve the purpose for which they are intended. Among the other methods, however, may be mentioned a floor switch installed in such a position as to bear the weight of the booth occupant, thus closing the circuit. Still another way is to provide a spring stool which operates a switch when the occupant is seated.

The cost of any of the methods mentioned is very small, and it is felt that all companies should be able to stand the investment at least in booths controlled directly by their operators. Leased booths on P. B. X. boards are a different proposition, and the installation is then properly to be made by the lessee. Telephone companies should try and interest such lessees, however, and could easily make arrangements to install such systems at a little above cost. In any event, booth ventilation and lighting of the proper sort are a direct advantage where the booths are controlled by the telephone company.

The writer wishes to acknowledge the courtesy of the Westinghouse Companies Publishing Department and the Fort Wayne Electric Company in supplying illustrations showing mounting of fan motors in telephone booths.

Accounting Methods Prescribed by Nebraska Railway Commission

Following is the text of a circular issued by the Nebraska Railway Commission outlining a uniform system of accounting for telephone companies:

To All Telephone Companies Operating in the State of Nebraska:

Under subdivision r, section 2, of the Railway Commission Act, approved March 27, 1907, the Nebraska State Railway Commission is authorized to prescribe the forms of any and all accounts, records and memoranda to be kept by carriers subject to the provisions of the Act, including the accounts, records and memoranda of the movement of traffic, as well as the receipts and expenditures of money.

A uniform system of accounting for telephone companies has been found essential to the proper regulation of such carriers and the compilation of such reports as are contemplated by law. Recognizing this fact, a committee was selected at the last annual convention of the Nebraska Independent Telephone Association for the purpose of conferring with the Commission on this subject. Conference was held on January 16, 1909, being participated in by representatives of the Nebraska Telephone Company, as well as the Independent interests. The Commission was at that time requested to prepare a tentative system of accounting to be submitted at a later meeting, which was done, the final conference being held on April 16, 1909, and the following methods agreed upon.

In submitting the results of these conferences as a part of this Circular, the Commission realizes that the adoption of the forms outlined will necessitate a radical change in the bookkeeping methods of many companies. While tables Nos. 1, 2 and 3, with accompanying explanations and instructions, are issued as suggestions rather than in the form of an order, the Commission hopes that their adoption will be general, and urges such action on the part of the companies for the reason that it will protect them from annoyance later by providing an adequate basis for such reports as are required by law.

Further suggestions in the form of specimen ruled blanks, containing all necessary subdivisions of accounts, will be mailed from this office upon application.

The Commission hopes for and confidently expects the hearty co-operation in this matter of all companies operating in Nebraska, to the end that the telephone business may be placed upon as sound a footing as that of other common carriers which have been longer established.

GENERAL INSTRUCTIONS.

In order that a uniform system of accounting for the telephone companies operating in the state may be adopted, the Nebraska State Railway Commission has taken up the matter, and has had a set of accounts formulated which presents its ideas as to how these accounts should be divided.

The main idea in preparing these different tables and accounts has been to clearly define the different natural divisions that exist at present in the operation of the telephone business. In order to make the classification as simple as possible, the five hundred or more different operating companies have been divided into four classes, viz.:

Class A. Companies whose total assets exceed $500,000.

Class B. Companies whose total assets exceed $20,000 and are less than $500,000.

Class C. Companies whose total assets do not exceed

$20,000, and which are other than exclusively mutual companies.

Class D. Companies doing an exclusively mutual business. (Companies coming under this class must have no rented exchange or toll service.)

These instructions have to do only with companies which belong to Classes B and C.

In order to have a definite starting point table No. 1 has been prepared. By reference to this table, it will be found to contain ten separate primary accounts, with a number of subdivisions of some of these primary accounts. Companies coming under class B will be expected to divide their property so that all of the primary and sub-accounts shown in table No. 1 will be filled out. Companies coming under class C will be expected to fill out the primary accounts only.

In the formation of a new system of accounting for telephone companies of this state, the Commission feels that it is absolutely necessary for the exact physical condition of each of the operating companies to be shown. In order that this might be done, table No. 1 has been prepared and each account explained so that the manager or board of directors may know just how to subdivide the real and personal property. *True value* is intended to represent what the managing officers of each company consider their property worth to them as an operating telephone exchange.

The matter of depreciation in the opening trial balance and in table No. 1 is left for the managing officers to decide. It is impossible at this time for the Commission to lay down a code of rules or percentages that can be used by all companies in arriving at the amount which should be deducted from the original cost price, but it will be readily seen that in order for rules and percentages to be worked out for future guidance, it is necessary that definite values be placed on the various classes of property which go to make up a complete operating telephone exchange. The Commission does not intend to convey the idea that a reduction must be made from the original installed cost price of every item of property, but it does wish each reporting company to place a true working value on its property so that should a physical valuation be made by the Commission, the value so found would not vary greatly from the value placed on the property by the reporting company.

From the experience of the Commission during the past two years, it is strongly of the opinion that the matter of *new construction* is a more or less confusing element to a large number of the reporting companies. The revenues earned from operation and money paid in by stockholders, as well as money borrowed, is indiscriminately used in putting up new lines and increasing the number of exchange subscribers, and at the end of the reporting or fiscal year it is impossible for the reporting companies to arrange their accounts so that the information called for in the annual report can be definitely furnished. In order to avoid this confusion, the Commission finds that the telephone business of companies in classes B and C should be divided into the four following distinct divisions:

1. True statement of assets and liabilities as they exist on July 1, 1909.
2. Actual operating revenues and expenses for the year July 1, 1909, to June 30, 1910, inclusive, not including interest, taxes or dividends.
3. Actual amount of money paid out for new construction during the year, correctly divided between the several accounts as shown in table No. 1.
4. Correct statement of distribution of net income from the year's operations.

INSTRUCTIONS FOR TABLE NO. 1.

1. Real Estate.

Under the primary account of Real Estate should be shown the true value of all real estate owned, as it stands in the capital account on July 1, 1909.

2. Buildings.

Under this primary account, two subdivisions should be made: (a) *Central station building;* (b) *All other buildings.* These two accounts should be charged with the true value of said buildings as found to exist on July 1, 1909. If the actual cost of the buildings is known and the present value equals that amount, then the actual cost price may properly be charged against this account. If the buildings have not been properly cared for and have materially depreciated in value, such depreciation should be determined and the amount thereof deducted from the actual cost price. If the actual cost price is not known, then the true value of the buildings should be appraised by the board of directors of the reporting company, and the amount so fixed charged against the proper account.

Table No. 1.

TRUE PHYSICAL VALUATION
of the
.....Telephone Company,
located at....., Nebraska,
as of July 1, 1909.

1. Real Estate.
2. Buildings.
   a. Central station.
   b. All other buildings.
3. Exchange Central Equipment.
   a. Switchboards.
   b. Office Furniture.
   c. All other central exchange equipment.
4. Exchange Aerial Equipment.
   a. Poles.
   b. Wire.
   c. Cable.
5. Exchange Underground Equipment.
   a. Conduits.
   b. Cable.
6. Exchange Subscribers' Stations.
7. Utility Equipment.
   a. Teams, harness and wagons.
   b. Tools and machinery.
   c. Repair supplies.
8. Toll Equipment.
   a. Poles.
   b. Copper wire.
   c. Iron wire.
9. New Construction Equipment.
10. Warehouse Supplies.

3. Exchange Central Equipment.

This primary account should be divided into three sub-accounts: (a) *Switchboards.* This account should be charged with the true value of all switchboards, both exchange and toll, and all inside connections, including generating apparatus, as they exist on July 1, 1909. If the actual cost price installed is known, and the value on July 1, 1909, equals that amount, then this account may properly be charged with same. If the cost price is not known, the board of directors should have the estimate value determined and used as a charge against the account. (b) *Office furniture.* This account should be charged with the true values as of July 1, 1909—actual cost price, where known, after allowing for depreciation. Where actual cost is not known, the estimated true value may be used as above explained. (c) *All other exchange central equipment.* This account should be charged with the true values as of July 1, 1909, of all other equipment used in the operation of the central station, after making proper allowances for depreciation. Any item shown in this account valued above $100 should be specified in the opening account.

4. Exchange Aerial Equipment.

By the term "aerial equipment" is meant all of the outside construction other than that placed underground. This primary account should be divided into three sub-accounts: (a) *Poles.* Against this account should be charged the actual cost of buying, transporting, setting and equipping poles, including cross-arms and pins, used by the operating company, other than those used exclusively for toll service, the value to be taken as of July 1, 1909. As far as possible the actual value of the pole lines should be ascertained, due allowance being made

for depreciation from the original cost. Where the original cost price cannot be ascertained, an estimated value may be used, as previously explained. (b) *Wire.* This account should be charged with the actual installed cost price of all wire, including insulators, owned by the operating company, other than that used exclusively in toll service. The value should be taken as of July 1, 1909, due allowance being made for any depreciation that may have occurred since installation. Where the true or actual value cannot be found, the board of directors may have an estimated value placed on such equipment and that amount charged against this account. (c) *Cable (acrial).* The charge against this account should be made on the basis of the actual installed cost price, less the depreciation credit to July 1, 1909. Where the actual cost price is not known, the account may be charged with an estimated true value, as authorized by the board of directors.

5. Exchange Underground Equipment.

This primary account should be divided into two sub-accounts: (a) *Conduit.* This account should be charged with the actual installed cost price of all conduit used by the reporting company as of July 1, 1909, said amount to include all money spent in preparing the conduit ready for the placing of the cable. It is generally considered that there is no depreciation allowance necessary on this class of construction; however, if there be any, it should be deducted from the actual cost price. Where the actual cost price is not known the account should be charged with an amount authorized by the board of directors of the reporting company. (b) *Cable (underground).* The charge against this account should represent the actual installed cost price to the reporting company, less a proper allowance for depreciation, same to be as of July 1, 1909. Where the cost price is not ascertainable, the board of directors may determine the proper amount to be charged against this account.

6. Exchange Subscribers' Stations.

This primary account should represent the actual amount of money paid out for all operating telephones installed and owned by the reporting company. It is intended that this account shall exclude all equipment used and the cost of installing same, up to where the connection drops from the pole. The true value as of July 1, 1909, is to be arrived at by deducting from the actual installed cost price the amount of depreciation which has taken place up to that time. When the actual cost price is not known, the board of directors may authorize an estimated amount to be charged against this account.

7. Utility Equipment.

This primary account is intended to represent all tangible property owned by the reporting company not enumerated above, and may be divided into as many sub-accounts as the peculiar necessities of the reporting company may require. This account should, however, be divided into at least three sub-accounts: (a) *Teams, harness and wagons.* Against this account should be charged the true value of the property as of July 1, 1909, the actual cost price, less depreciation, to be used where possible. When this cannot be ascertained the board of directors may authorize the estimated true value to be charged against this account. (b) *Tools and machinery.* Against this account should be charged tools, machinery and other equipment used in the actual maintenance and operation of the reporting company, the actual cost, less depreciation, as of July 1, 1909, to be used where same can be ascertained. Where this cannot be done the board of directors may authorize an estimated amount to be so charged. (c) *Repair supplies.* This account should be charged with all supplies on hand July 1, 1909, that are to be used in the maintenance of the plant as a whole. The actual cost price should be charged and freight and drayage added to the invoice cost. It must be distinctly understood that this account is *not* to be charged with any material or supplies on hand July 1, 1909, which are to be used in increasing the size or efficiency of the plant. Such property belongs to New Construction Equipment (item No. 9). The amount charged against this account must not be estimated, but the true value must be ascertained and a complete list of such supplies compiled and kept in the office of the reporting company. Where the reporting company carries a warehouse supply account (see item No. 10), this account need not be set up.

8. Toll Equipment.

It is intended in this account to show charges against toll equipment which are clearly defined. Wires, poles, etc., used in toll business *exclusively* are to be considered. This account should be divided into three sub-accounts (a) *Poles.* This account should be charged with the installed cost price of the poles, cross-arms and pins complete as of July 1, 1909, after depreciation has been deducted, as explained above. Where cost price is not known, the estimated value may be used. (b) *Copper wire.* This account should be charged with the true installed cost price as of July 1, 1909, of all copper wire, including insulators, used exclusively in toll business, proper allowance being made for depreciation. Where the actual cost price is not known the estimated value may be used. (c) *Iron wire.* This account should be charged with the true installed cost price as of July 1, 1909, of all iron wire, including insulators, used exclusively in toll business, proper depreviation to be allowed. Where cost price is not known the true value may be estimated by the board of directors.

9. New Construction Equipment.

This account is intended for a clearing account only. Should the company have material on hand July 1, 1909, which is to be used for increasing the size or efficiency of its plant, and the cost of which is represented on the liability side of its opening trial balance, the actual cost price of all such material should be charged against this account. When such material is placed in the plant the proper primary account should be charged and this account credited. As an illustration of the above, let us suppose that five miles of copper wire and a sufficient number of poles, say 150, to string same, is on hand July 1, 1909, and that the cost of the wire is $400.00 and the cost of the poles $150.00. Now let us suppose that this material is used to extend the exchange system. Primary account No. 4, Exchange Aerial Equipment, subdivision a, *Poles,* would be charged with the poles, plus the expense of outfitting and setting same, and subdivision b, *Wire,* would be charged with the wire, plus the cost of stringing same. New Construction Equipment account would then receive credit for the amounts charged against these two accounts Nos. 4, a and b, less the cost of labor. The entry on the journal would run as follows:

	Debit.	Credit.
To poles, aerial exchange.....	$200.00	
To wire, aerial exchange	500.00	
By new construction material		$550.00
By cash, labor.....		150.00

NOTE.—This account need not be set up where the reporting company has a Warehouse Supply account (see item No. 10).

10. Warehouse Supplies.

This account must be set up where accounts Nos. 7 and 9 are not kept, and must include all material on hand for all purposes on July 1, 1909. The actual cost price, as shown by a true inventory of all material on hand July 1, 1909, including freight and drayage, should be charged against it. This account is to be used as a clearing account of all material purchased and received by the reporting company during the operating year. As soon as any material is received, the amount of the invoice should be credited to the firm from whom purchased, and the Warehouse Supplies account should be debited with this amount. When material is used for either operation

renewals or for new construction, Warehouse Supplies account should be credited with the material so used and the proper primary account charged.

It will be readily understood that the preceding table and explanations have to do only with the question of a physical valuation of all operating companies, as their officials may find the same to be on July 1, 1909. This table was prepared so that definite divisions of the values of telephone properties might be uniformly maintained throughout the state of Nebraska. The main object in having table No. 1 made up is to find a proper starting point for the opening of a set of operating accounts, so that the details of operation may be definitely ascertained at any time.

(To be concluded.)

Proper Rates for Rural Service.*

By A. H. Doudna.

This subject has become one of very great importance to the operating companies, particularly in the larger cities and towns, as any telephone company's strength in the city is largely dependent on its holding in the rural districts; by this I mean that to the company having the largest number of rural connections, either in the way of switching telephones owned by the farmers companies, or rural lines owned outright by the telephone company, will come the greater bulk of the business in the city. Upon the city business depends the income to satisfy stockholders and the investing public who may, if our property shows a good and sufficient earning, become interested financially.

As a consequence, about all we should figure on from the rural subscriber's station is enough remuneration to play even on operating and maintenance, which as a matter of fact, we are not all doing.

The rates for rural subscribers may be divided into three distinct classes, and in some cases we may consider a fourth, as follows:

First Class: Where the farmers own their own equipment and make application to us for switching, expecting us to furnish the same free service we give to our own subscribers.

Second Class: Where we own the lines and equipment outright, maintaining them, and charging the farmers an annual rental, giving them the same service as local subscribers of that particular exchange.

Third Class: Where either party owns the equipment and a toll is charged for every message both in and out.

Fourth Class: Where a Farmers' Mutual company comes in with about one-tenth the number of telephones we may have, and not one-tenth the investment we have, and demands free exchange, at the same time threatening that if refusal is made it will go to the other company.

Of these four classes there are probably more of the first, and upon the rate we can charge them depends the amount and class of service we can give; in a great many cases this switching is done for $1 to $1.50 per annum, which is insufficient, as the actual cost of switching in even the most economically operated exchange is at least $3 per annum, and from that to $5 or $6 in some of the larger exchanges. The practice in our company is to charge nothing less than 25 per cent of the total amount of rental received and from that to $6 per annum, according to the service given, which we find to play about even year by year. We should none of us, at any time sell any class of service for less than cost. Like the grocer who makes a leader of some staple article, say sugar or coffee and sells it at about cost, so should we with our rural service make a leader of this class, but never sell it at an actual loss.

With this class a long term written contract should be made, as experience has shown that just as soon as the contract expires they begin to think, "well, now we have a pretty good number of telephones on our line, and we will make those fellows give us a better contract this time or we will go to the Bell, who will take them in order to get them and beat the other company, even if it has to do so at a loss."

It is a very good thing to have a rural following of our own to make these fellows stay in line; by this I mean such a following as the second class represents.

In this class the farmer owns nothing, unless it be the poles, and pays a yearly rental the same as the city subscriber. This is much the most satisfactory class, as regards giving trouble, because when you once get a farmer connected up this way he is satisfied and sticks, and where we do not have to build too far to get them, this system is preferable to any other.

There are, however, a great many of the more remote districts where the expense for the telephone company to build is positively prohibitive, and service could not be handled under this class at all. Also the maintenance to the telephone company would be too great an item, while the farmer, being on the ground, can maintain the line at a small cost.

The rate to be charged for this class of service should be no less than the regular four-party rate in town, in this matter we should be very careful to make no discriminations whatever. Treat every one alike!

There are a few farmers of the third class, and this is really the most satisfactory and best all around, where the farmer owns his own lines and instruments, connecting with us on a toll basis. The condition under which everybody pays for what he gets, no more and no less, is the coming solution of the telephone business, making it just the same as with the gas and water companies today. Some of the best satisfied patrons we have are on this basis, and I am only sorry there are so few of them connected to our exchange.

The fourth and worst lot of all are the people who have built up a rural community of a few hundred telephones, and imagine we cannot get along without them. These simply come and demand free exchange of service, even though they may have very little investment as compared with ours, and not nearly so many telephones. Yet they will argue the advantages of their line, and how we cannot get along without them. Very little can be done with this class of people until they get some schooling in experience, which they are sure to get if they operate their telephones for a few years.

There are getting to be a great many rural telephones on one plan or another in the outlying districts, and so far from the farmers being isolated and behind the times as they once were, they have the best of a great many of their better located city friends. They can sell their produce before they leave home, and lose absolutely no time in bartering when they get to town. With the new law, as it is in the state of Ohio, even if they are on a party line and listen they dare not mention it for fear of punishment, according to law.

There is one very advantageous feature in all rural service furnished which is that, for any rate the farmer may agree to pay, even though it be small as compared to some other classes of our service, there is absolutely no trouble in collecting. He is prompt, as a rule, and if we get him once properly educated to it he will pay by means of the R. F. D., which makes the cost of collecting very low.

*Presented at the convention of the West Virginia Independent Telephone Association.

History of the Automatic Telephone*

The Lorimer System—Continued

By Arthur Bessey Smith

Assistant Professor in Telephone Engineering, Purdue University.

Callender's Move to New York.—Since the funds of the Brantford men had run low, Mr. Callender cast about for an additional source for means to carry on the work. Mr. J. Hood Wright, of New York, offered to advance money for the purpose on condition that he move his operations to New York. To this Mr. Callender agreed, and in the spring of 1894 he made the change, taking Hoyt Lorimer with him. After arriving in New York he wrote for George Lorimer to come also. This he did, arriving in the city a few weeks later.

Mr. Callender selected and rented fine rooms on the tenth floor of the Decker Building. Here a comfortable office and private laboratory were fitted up for him. A general workshop was arranged for the Lorimer brothers. Here for a year or more the development was continued. At first they tried to construct a system based on the old plans in Brantford. But new difficulties were encountered, which led to the construction of a still different plan.

STROWGER AND CALLENDER COMPARED.

It will be highly instructive at this place to get the viewpoint of Mr. Callender in his endeavors, and compare it with the line of attack followed by the developers of the Strowger system, whose history has been treated previously. It will be remembered that Almon B. Strowger started with the simple conception of a cylindrical switch with ten rows of inside contacts, each row having a hundred contacts; an axial shaft carrying a spring or wiper and adapted to be raised to any row and rotated to any point in that row, the latter motion being made in two ways, first in jumps of ten notches each for the tens digit, followed by individual steps for the units.

Since that day other switching devices have been tried, only to return to the cylindrical bank and the axially mounted wiper. The bank has shrunk from 1,000 circuits to 100, and occupies only a portion of a cylinder. Except in the case of the connector, the vertical motion has been made to select groups, the rotary being devoted to seeking a non-busy trunk.

In his second New York system Mr. Callender made the real start which, later, under the remarkable work of other hands, developed into the Lorimer system, though the latter is very little like the former. To show the germ principle of Callender's system, Fig. 131 has been prepared. Suppose that we have a number of concentric metallic conducting rings, 1, 2, 3, etc., as many as are necessary to serve the traffic of the exchange. 4, 5, 6, etc., are three of the 100 subscribers lines which enter the system. The single line and ring must be understood to represent as many separate conductors as are included in one circuit. If, now, by some means we can connect two of these subscribers' lines to any one of the rings, those two will be able to talk to each other. Further, it is necessary to provide only enough rings to serve the largest number of connections which may be needed at any one time. From the records of those days it was taken to be ten per cent of the lines, which would give ten rings for a 100-line exchange. This is known as the percentage idea, and is now known to be the only correct basis for arranging exchange apparatus. It is in sharp contrast to the early Strowger idea, which for many years followed the starting point of individual switching mechanism.

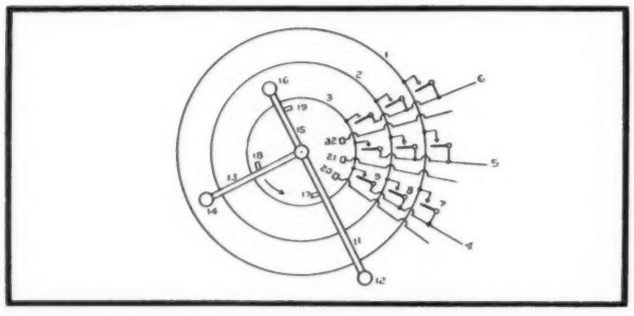


Fig. 131—Scheme of Callender's Selector-Connector.

CALLENDER'S SECOND NEW YORK SYSTEM—MAIN POINTS.

The means by which Mr. Callender proposed to connect the lines to the rings is briefly given in the following description: In Fig. 131, 7 is an iron armature which normally lies down clear of the ring 1, but when raised will connect line 4 to ring 1 and stay there until pushed down again. Eight is a similar device for connecting line 4 to ring 2, while 9 is for ring 3. In a similar way each of the hundred lines is equipped with iron armatures for connecting any of them to any of the rings.

Carried by a central shaft, 10, which is maintained in constant rotation by a motor, is an arm, 11, carrying on its end an electromagnet, 12. During its revolution magnet 12 passes over all the iron armatures which may connect with ring 1. Mounted on another arm, 13, is a magnet, 14, which governs all the armatures connecting to ring 2, while arm 15 carries magnet 16, which presides over ring 3. Each conducting ring, its revolving magnet, and accessory apparatus is termed a "division." The sub-station apparatus was the same as described in the last chapter.

The plan was to have the sub-station (No. 4, for instance) send in a preliminary impulse which should render its contact plate (20) electrically alive. As the shaft is constantly revolving, the wipers, 17, 18, 19, etc., of the various arms, will pass over all the contact plates in succession. After a subscriber, by the preliminary impulse, had rendered his plate (20) alive, the first brush (17) thereafter to touch it would momentarily energize its magnet (12) causing the iron armature (7) corresponding to both line and ring to be pulled up, thus connecting the two. A series of impulses are now sent in by the signal transmitter at the sub-station, which has indirectly the effect of energizing the magnet (12) of the same division just as it passes the called line, pulling up its armature into contact with the same ring (1), thereby establishing electrical connection between the two subscribers. A single release relay was to be left connected to the circuit, which on an impulse from the calling subscriber energized a release magnet mounted on the revolving arm of the division used, which during one revolution moved a lever down so as to press down all armatures in that particular circle. The working out of the above ideas called for considerably ingenuity.

Each subscriber's line was equipped with an individual switch, which was progressively rotary, with six positions. After each use it was returned to normal by being rotated ahead to the end of 180 degrees, which constituted its cycle. The preliminary impulse, which was, like all the selecting impulses, furnished by local battery at the sub-station, stepped the individual switch off normal, which brought into play a circuit which energized the seizing magnet of the first division to pass that line. This in turn moved the individual switch

*Continued from issue of June 5, 1909.

another step so that the impulses from the sub-station would reach the "numerical receiver," or "signal register," which consisted of a wiper arm swinging over a bank of contacts. This was used to indicate the number of the called line. It was not a part of the talking circuit, but was used merely to cause the same division to pick up or seize the correct line.

For each "division" there were two signal registers (a units and a tens receiver). Their arrangement is shown by

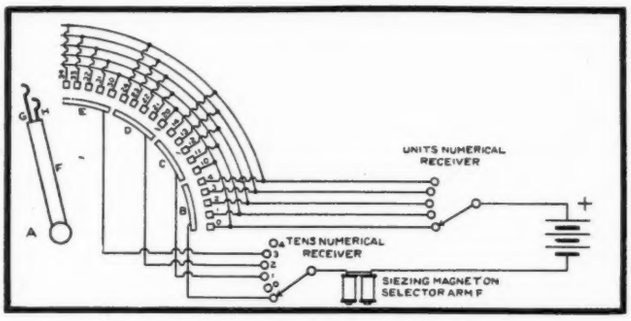


Fig. 132—Callender's Numeralizing Scheme.

Fig. 132. Let *A* represent that part of the selector-connector which has to do with "numeralizing," that is seizing the called line. Let the series of contact plates 0 to 4, 10 to 14, 20 to 24, etc., be the individual contacts, one per line. The contacts 0 to 4 are supposed to represent the full ten from 0 to 9, also 10 to 14 may be taken for 10 to 19, so that there will be a full hundred lines around the circle. These individual contacts are multipled to the bank of the units numerical receiver, so that like units digits are wired to the same plate. Hence, 2, 12, 22, etc., are wired to point 2 of the units receiver bank.

B is a segment of a feed ring lying opposite the ten contacts 0 to 9, *C* is a segment opposite the contacts 10 to 19, etc. Each segment is wired to a bank contact of the tens numerical receiver, *B* going to the normal contact, *C* to the 1 point, *D* to the 2 point, etc.

The constantly revolving arm, *F*, of the selector-connector carries a pair of bridging brushes, *G H*. *G* wipes over the units contacts, and *H* over the tens segments, *B*, *C*, *D*, etc. In circuit with the two receivers are battery and the seizing magnet. The latter is mounted on the rotating arm, and is the one which lifts the armatures of the line into contact with the connecting ring of its division. As long as both numerical receivers are at normal the circuit is broken and the arm and magnet rotate with no effect. Suppose the subscriber who gets the use of this division calls subscriber No. 2. He will accordingly send in three impulses, which by a circuit not shown steps the units numerical receiver around three notches to the point marked "2." This makes all the No. 2 contacts (2, 12, 22, 32, etc.) "alive" with positive battery, but only segment *B* is connected to the seizing magnet. Hence when the brushes *G* and *H* wipe past the contact 2, the magnet will be momentarily energized, thereby lifting the armature of line No. 2 into contact with the ring of that division.

If a call is made for a number higher than 9, two series of impulses are sent in from the signal transmitter at the sub-station. The units impulses come first, followed after a brief interval by the tens. As these two series come over the same wires, but must be made to affect different receivers, some means must be used to switch the second series to the tens receiver. Here Callender attempted to use a vibrating reed, calling it a "numerical separator." The end of the reed wiped past a fixed contact. As long as the units impulses were coming in the reed kept vibrating, not making contact long enough to have effect. In the interval between the units and the tens impulses the reed came to rest, and closed contact long enough to operate a circuit which switched the line to the tens numerical receiver.

Accordingly, if a call were made for No. 32, the units receiver was first stepped around to point 2, then the tens receiver was set to point 3. This secured the picking up of line 32.

Each division included the following apparatus: three connecting rings and three magnets on the selector-connector, two numerical receivers (units and tens), a percentage controlling switch, a signaling track and ball, and a release relay. The percentage controlling switch had many of the functions of a side-switch, shifting circuits at various points during the progress of making a call. The signaling track consisted of two conducting rails on which rolled a copper ball. The track was divided into fifteen sections. The ball was released after the number of the called line had been recorded on the numerical receivers. The ball was used to prevent a line from being called by two people at once, and to store up the second call. It also closed the numeralizing circuit described above, rang both bells, gave the busy signal if the called line were busy, and helped in the release.

When it came to actual trial the vibrating "numerical separator" failed to give satisfaction. Its place was taken by a weighted lever mounted on the arm of the units numerical receiver. While making the progressive motion forward the circuit was held closed onto the units receiver motor magnet by inertia. But when the arm stopped, the weight fell forward switching the line to the tens receiver.

(*To be continued.*)

Tillotson on Telephone Financing.

A most significant discussion of the possibilities which are open to organized Independent telephone companies for the improvement of the market for their securities is contained in the brief, informal remarks delivered at the Ohio convention by Mr. E. G. Tillotson, the new president of the Cuyahoga Telephone Company. On account of the high position and recognized ability of Mr. Tillotson in financial and banking circles, his ideas have additional weight, but the influence of the expressions will be none the less because they are stated so simply and clearly as to appeal to right-minded managers as setting forth the thing which seems the most likely to prove itself correct when analyzed in the light of their own experience.

Mr. Tillotson said:

"For a number of years, I have been one who has to pass upon the value of securities, mostly Independent, from the lending standpoint, from the banker's standpoint. I have seen that they had a narrow market; that they were quoted low, many times far lower than their intrinsic value warranted.

"Let us see what we can do to bring these securities up to a point where they should be. I have a circular from a large banking house of New York offering telephone securities. I saw the advertisement in the Wall Street Journal and sent for it. The advertisement did not state what it was. I suspected it was a Bell security, and my suspicion was verified. The earnings of the company show for the year 1908 that it earned about 40 per cent more than its interest; that is, not quite one and one-half times its interest. The banking house is asking 98 for a 5 per cent bond issued by a corporation which does not earn twice its interest. In Ohio I know where a company is earning six times its bonded interest, and I do not think its 5 per cent bonds ever have sold to the general public over 89. I know of another company that is earning three and one-half or four times its interest. I do not think that its bonds have ever reached 90. What are the reasons? They are manifold. You have to go back to the early days of telephone competition to ascertain them. For many years the question of patent rights was agitated, and the investing public stood aloof from your securities because they thought there was patent litigation and that in the end

all Independents would be put out of business. The patent fight was won. There is no monopoly in that line now, as I understand it, excepting a few little devices.

"Next, there has been a persistent campaign of innuendo, which, no doubt, has its origin in Boston, whereby the great investors of this country situated east of the Allegheny Mountains have been led to think that the Independent telephone business is a bubble, likely to explode at any moment. Unfortunately, there have been explosions of some bubbles, and we must prevent any more, if we can. I don't know what the general policy is of Independents, but I expect that, like other public utility corporations, along with some of the Bell companies, some Independent telephone companies do not keep their books quite right. They are deceiving themselves more than they deceive others. I do not think that they have provided sinking funds to retire their debts. Now, those causes lie within ourselves to correct. We must make our securities intrinsically above suspicion. We must keep our books so honestly that we do not fool ourselves or fool our investors. We can do that. There is a profit in the business. But let us forego, if necessary, dividends on stock, which is bonus stock in some instances, create a depreciation reserve that is ample for every requirement, so that we can go to the best bankers in New York City and lay down our books before them, and they will see that we have kept our books correctly. When we do that, the market will be gradually opened. But it will take a long campaign of publicity.

"I listened to a part of the remarks of the president of the International Association, and was greatly impressed with what he said. He touched upon an idea that I have had since the very first week that I was in the business. That is the necessity of some financial institution. I do not know that I agree with him on the necessity or the wisdom of a financial institution of deposits. It may be well to have such an institution. I do not thoroughly agree with him that we ought to have a great banking house, with capital and organization sufficient to create a market for our securities. That house should be big enough to have foreign connections; because when you trace the ultimate lodging place of Bell securities you find them in Holland, in Belgium and in Germany. I think that matter which the president of the International Association brought up is the most important thing I know of. Co-operation among all the Independents of this country in such an institution, whether in your wisdom it be an institution of deposit or whether a great selling organization, is necessary. It remains to be demonstrated which plan would be the best, but one plan or other is certainly needed.

"Then, again, you need a campaign of publicity. First, clean your house so that there is nothing to be ashamed of, and then create a bureau of publicity, whether it be through the International organization or a separate organization. Hire a trained corps of writers, if necessary.

"The average investor in Columbus, the average investor in Cleveland, does not buy Independent securities. He buys other public utilities securities. He will buy manufacturing stock. He will buy railroad bonds. Why? Because he has not confidence in the telephone situation. Now, we know that our securities are all right. We must educate the public so that it will know the value of the securities we offer. Wonderful results can be accomplished. * * * We have labor organizations that have a fund of three millions of dollars, gathered up from their members who earn a dollar and a half to three dollars per day. * * * Why shouldn't you have a defense fund of one million or two million or three million dollars? What does such a situation mean to you with all the tens of millions that you have invested?

"There was another thing that was touched upon by Mr. Mr. Critchfield—the constant campaign of the Bell people attacking you, picking up an exchange here and another one there. I know their policy. I have been in touch with them. They have the advantage because they are one unit, one central organization, with one head, and backed by some of the greatest bankers of America. Those bankers are in there and they cannot get out. I think a lot of them would be glad to get out if they could, but by the exigencies of the case they have got to stand by the Bell company to make it go. What are we? A lot of scattered organizations. We have got to remain loyal to one another. * * * You are going to have as great a business as the Bell people: You cannot all be in one corporation, but you can all be in one organization, just as the Federation of Labor is. There is no limit to your possibilities. Mr. Critchfield has told about the use of the telephone. I can remember just a few years ago when Cleveland had 5,254 telephones. We thought we had a pretty good service. My superiors in office, Mr. Brailey and Mr. McVey, now say we have 55,000 telephones in Cleveland, and that there is a crying demand for more. You are not furnishing telephones; you are furnishing service in the twentieth century way of doing business. A man will give up one of his servant girls before he will give up his telephone.

"I do not know the difference between a receiver and a switchboard, except as I have had it pointed out to me; but I do know that the business—if it is operated honestly, if it is capitalized honestly, and the books are kept honestly—is a profitable business, good enough for anyone to be in; and when you have that you can convince your friends, your customers, that they ought to own securities. We must first open up a security market here in this great middle West, where the strength of the Independents lies. Ultimately, if it is necessary for the expansion and increase of business, we must open up the rock-ribbed treasure boxes in New England. We cannot do that until we can show a united front against the Bell aggressions."

Memorizing Ohm's Law.

Most of us take little stock in schemes for fixing facts in the memory. For example, here is an item recently contributed to the *Telegraph Age,* under the title "Ohm's Law Made Easy."

"E" stands for the pressure Which we are taught to use, Divided by "R," for resistance, Will give us "C," the juice.	$\frac{E}{R}=C$
"C" is "E divided by R," With this we don't get very far, But "E" is "R times C," you see,	$C=\frac{E}{R}$ $E=R\times C$
And "R" is "E divided by C."	$R=\frac{E}{C}$
"W," watt is "Current times Electromotive force," And "seven forty-six" of them The "Power of a horse."	$W=C\times E$ $746=H.P.$

Apparently the writer who conceived this complicated brain-teaser had never heard of Fleming's simple device to aid the memorization of the respective mathematical relations of current, resistance, and electromotive force. By printing the letters representing these quantities thus— $\frac{E}{C\ R}$ — and covering up any one letter, its mathematical equivalent in terms of the other two will remain—as, for example, by covering up E, we have left C R, which, of course, means in algebra, $C\times R$.

Maintenance*

By F. S. Lyman

That the principal asset of a telephone company is efficient operating service is universally admitted, and that system in the operating room is the largest factor in securing good service is granted. But the painstaking care and endless labor and energy expended in accomplishing this is largely dissipated and rendered useless, if not backed up by efficient maintenance of equipment.

Here, too, system is all important, especially in large plants where much time and money can be squandered by random methods of handling the trouble force and attending to trouble complaints. Consequently the first duty of the head of the maintenance department should be to devise the most efficient and reliable method of clearing trouble, applicable to the system he has in charge, at the same time keeping the expense the lowest and the interruption of service the shortest possible; and, next, to find the best methods of preventing the occurrence of trouble.

Every telephone company has a maintenance plan more or less systematically worked out to suit local conditions and the size of the plant. The method to be herein outlined may not differ essentially from that in use by other large companies, and probably will not be applicable in its entirety to smaller exchanges.

The plant of the Kinloch Telephone Co., at St. Louis, using this scheme for handling trouble complaints, comprises several exchanges, each in charge of a wire chief. Each wire chief has under him a number of troublemen, who carry spurs and are known as combination men, and a lesser number of men who clear instrument trouble only. These men are assigned to districts with fairly definite boundaries, into which the territory tributary to each exchange is divided.

All troubles are reported to the chief operator, or trouble clerk, and entered by her on a trouble card, on which is the subscriber's number, name and address, business, the cable and pair, and equipment in use by the subscriber. The trouble clerk is also furnished with a blank book in which she enters all numbers as they are reported. These trouble cards are ruled on both sides, with spaces on each horizontal line for the entry of the date and time the trouble is reported, the nature of the report, the trouble found by the inspector, the date and hour the trouble is cleared, and the inspector's name or number. The cards themselves are not larger than an ordinary envelope, but, by abbreviating, this information can all be gotten in. By ruling both sides, as many as twenty-five or thirty entries can be made on one card. This gives a record of each suscriber's trouble for some time back, and is valuable to the wire chief in showing up chronic troubles, and at the same time acts as a check on the inspector.

This record is also valuable to the contract department as a check on a subscriber's claim for rebate on the grounds of continued interruption of service. After the trouble report has been entered on the card, it is sent to the wire chief through a chute that terminates on his desk. The line is tested by him, and the result of the test entered in the proper space on the card. The case of trouble is then given by him to a switchboard man, if it be a case of switchboard trouble, or to the troubleman or inspector in whose district the subscriber is located if it is a case of line or instrument trouble. This the wire chief can usually determine from his tests and the nature of the complaint.

When the trouble has been cleared, the troubleman's report as to the trouble found is entered on the card, together with the time and the inspector's name. The card is then returned to the trouble clerk and cancelled on the trouble book; thus the operating department is kept informed as to the amount of trouble still existing, the possession of which information all operating men will admit to be a distinct advantage to that department.

Each inspector is required to hand in, each morning, a report on the work done by him on the preceding day, showing each visit made and the trouble found, together with the time cleared. On the backs of these reports he is required to report any cases where temporary work was done, or any work for the construction or equipment departments which may have come to his notice.

Before returning the trouble card to the trouble clerk, the wire chief makes an entry on a monthly report sheet which shows the nature of the trouble found. This sheet is divided into:

1. Switchboard troubles.
2. Line troubles.
3. Instrument troubles.
4. Cable troubles.
5. Private branch exchange troubles.

Each of these general headings is divided into a number of subdivisions sufficiently diversified to cover any case of trouble found. This report shows the number of cases cleared each day, what the troubles were, the number uncleared or carried over; the average time required to clear switchboard, line, instrument, cable and private branch exchange troubles, as well as the condition of the weather, which frequently explains a heavy trouble report. By looking over his monthly report, the wire chief can determine if there is any particular part of the plant on which the maintenance is unusually high, and start an investigation to determine the cause and the remedy. It may be due to defective material or improper installation, and the trouble might have existed indefinitely if each day's trouble had not been tabulated on a report where the preponderance of any one kind of trouble could not escape notice. A report of this kind is turned in by the wire chief of each exchange at the end of the month. From all these reports another is compiled, in the form of a summary, showing for each office the number of switchboard troubles for the month, with the average time of clearing them; the number of line and instrument troubles, and average time clearing them; the number of private branch exchange troubles and the average time clearing them; the number of cases of cable troubles, and average time clearing them; the average time clearing all troubles, and average time clearing all troubles exclusive of cable troubles; the number of cases carried over during the month; the number of lines and number of stations in each office; the number of cases of trouble per 1,000 lines and per 1,000 stations together with the number of employees in each office. This report furnishes a means of rapid comparison between offices as to the amount of trouble in each, and the time consumed in clearing them, as well as the comparative cost of clearing trouble in each exchange. The fact that these comparisons are made acts as an incentive to each wire chief to make the best possible showing in his exchange.

So much for the general method of handling trouble. It is efficient in that a subscriber's complaint can hardly fail to be recorded, tested, and cleared in a reasonable length of time; it is reliable in that it furnishes a permanent record of the subscriber's troubles and of the wire chief's and in-

*Abstract of a paper presented at the convention of the Missouri Independent Telephone Association.

spector's work, which fact in itself minimizes the possibility of careless work or misrepresentation on their part.

That the expense of clearing trouble may be as low, and the interruption of service as short as possible, depends in great measure on the wire chief's ability to assign the work to the troublemen systematically, and upon the capability and willingness of the troublemen. These men should be selected with special reference to their qualifications along these lines; next to executive ability a wire chief's personality is the greatest factor in getting results from the men under him. The regular trouble force should be kept as low as is compatible with securing reasonable dispatch in clearing trouble; any reserve force should be in the construction and equipment departments. The average gang man is not a competent "trouble shooter," although he may be an excellent construction man. It falls upon the wire chief to help himself by helping these men to a better understanding of the proper way to look for trouble. Here the wire chief has an opportunity to show his ability on the coaching line. Men turned back to the gang by one wire chief as incompetent have, under the tutelage of a wire chief in another exchange, proved themselves to be at least fair troublemen.

As a rule the younger men in the construction crews develop into troublemen more rapidly than the older ones. They are quicker in grasping details, and do more thinking on their own initiative than a man who has spent his life in a construction crew. Such a man has an eight hour day gait cut out for himself, out of which it is next to impossible to shake him. He will never make the pace necessary for a good troubleman, for whom a day's work is determined by the amount of reported trouble, and not in terms of so many poles set or so many spans of wire strung. Any time spent by the wire chief in explaining to his men perplexing cases of trouble, or points about the operation of the plant, is time well invested as it stands to reason that the more a man knows about the operation of the plant as a whole, the better he is fitted for the discharge of his own particular duties.

Of equal importance to the rapid and economical clearing of trouble, once its existence is known, is the work done to prevent trouble occurring, and ascertaining that trouble exists and clearing it if possible before that fact is known to the subscribers. To this end several schemes suggest themselves of which the following have proved their value. A voltmeter test should be made every night, preferably in the early morning hours, on every line in the exchange, for grounds, "shorts" and opens. In making this test a voltage as high as 65 to 70 volts is recommended, as this will show up leaks that the exchange battery of 20 or 40 volts would not reveal.

The trouble so discovered should be entered on the trouble cards, ready for the wire chief to test on his arrival in the morning. Trouble so reported can frequently be cleared before the subscriber has occasion to use his telephone, and dissatisfaction on his part is avoided.

A night test is especially valuable after a storm. The wire chief can see immediately if there is more trouble than can be handled by his usual force, and his time to procure assistance from the construction or equipment departments before these men have gone out on work where they are not available.

This test also facilitates the location of cable trouble, which is the most serious trouble common to telephone plants, fires and sleet storms excepted. If the test shows a number of heads have pairs grounded, the wire chief should send his men immediately to these heads and test for trouble in the cable. If the trouble shows on the line ordinarily it should be neglected until every head which shows a possibility of trouble has been visited. The reason for this is that good galvanometer readings can probably be gotten on the pairs in trouble in the cable if the heads are visited at once, when it would not be possible later, when all the pairs might show trouble, as a clear pair is necessary in making an accurate galvanometer location. This is especially true of cables in common battery plants, where the exchange battery has a confusing action on the wet insulation. Another reason for neglecting line trouble in favor of cable trouble is the fact that the clearing of cable trouble is a slower process, and a larger number of subscribers are likely to be affected, so the bridge readings should be made and splicers set in with the least possible delay.

If it is seen that it will be impossible to clear the cable trouble on the day it develops the subscribers in these cables should be notified as to the nature of the interruption of their service and its probable duration. For this purpose, a circular letter is convenient in which the necessary details may be filled out in a short time. A letter of this kind forestalls a complaint by the subscriber and shows him that his inconvenience is a matter of concern to the company.

Another plan which has proved very efficient in forestalling trouble is a general inspection of the entire plant at fixed intervals, and many minor imperfections of equipment can be thus discovered and removed which would later develop into actual trouble. This inspection should not be made upon instruments alone, but upon wires, pole lines and cables as well.

All business telephones should be inspected and cleaned, woodwork as well as metal work, at least once in every three months. Residence telephones, which are not subjected to as severe wear as business telephones, need not be inspected so often. To keep the metal parts polished in a city, where telephones are subjected to coal smoke, is impossible. To keep the telephones free from dirt is the most that can be expected under these circumstances. The best cleaner to use is some soapy solution, with very little grit, that will remove dirt from woodwork and metal.

At least twice each year all pole lines and cable runs should be looked over, and repairs made at the time, or reports turned in on work necessary to put the line in good shape, if such repairs are too heavy for one man.

There will always be enough prospective trouble found to make these inspections pay. For instance, in the fall the lines in certain localities will be found decorated with kite strings, which will cause "shorts" in wet weather. Broken glass, bad arms, trees to be trimmed, drops which do not clear a cornice or some other obstruction, slack wire and a dozen other conditions will be found that will sooner or later cause inconvenience to some subscriber. The cost of clearing this up will be no greater before the subscriber has trouble than after, and the advantage to the service is obvious. A general inspection of cables may seem impracticable, but it has been found that much good can be accomplished by periodic inspection of cable heads, ground wires, goose necks, and laterals where the cables leave the underground. For the purpose of avoiding electrolysis in cities having electric railway systems, voltmeter readings should be taken at all manholes to ascertain the direction of the stray currents, and the cables bonded to the tracks at the points where the cable is positive to the track, or in other words, where the current is leaving the cable for the track. A very small difference of potential between the two will, in time, cause the deterioration of the lead covering.

Unusually severe complaints as to service and all letter complaints should receive particular attention. Even though from the nature of the complaint or context of the letter it would appear that the trouble is due to operating and not to any defect of line or apparatus, it is best to be certain of this before giving the case to the operating department to handle, as any irregularity of operating will naturally be augmented by faulty equipment. If nothing is found by the inspector to justify the severity of the complaint made by the subscriber, the inspector should be followed by the chief in-

spector if there is one, otherwise the wire chief should put the number on his call-up list, and keep in touch with the case until the subscriber is satisfied with his service.

As the operating department's efficiency is brought to its highest level by the medium of good maintenance, so is the wire chief in turn dependent upon the assistance and co-operation of the superintendents of construction and equipment. They can minimize the chances for trouble by the proper erection and installation of pole lines and line wires, drops, fuse blocks and house wire, and trouble due to defective installation should be taken up with them by the wire chief with a view to the prevention of their future occurrence. The wire chief must be thoroughly imbued with this idea of inter-dependence of departments and instill it into the minds of the men under him. They must not feel that their department is something separate and apart from the other interests of the company, but must realize that each is dependent upon the other and that upon the concerted action of all, more than upon individual achievement depends the ultimate success of their company.

Letters on Practical Subjects

Letters Instead of Numbers for Designating Local Trunks.

One feature of local trunking in multi-office districts has been the same ever since "B" boards and order wires have come under the writer's notice; that is, the numbering of the trunks. The numbers used are the same as assigned certain subscribers. Often, and especially when trunk positions and order wires are carrying a heavy load an "A" operator will take a subscriber's number from another "A" operator on the order wire circuit in the belief that it is a trunk number assigned by the "B" operator. The present method of numbering trunks generally used is the three figured number.

Numbers given over the order circuits are passed rapidy. Numbers given by subscribers to "A" operators can be listened to more carefully. Mistakes are numerous over order wires because so many numbers resemble one another in sound. Any number ending with five or in which five is the middle number may sound as if the "five" were nine. "Two five two" often sounds like "two nine two"; "two four five" like "two four nine," etc. In two figured numbers, "two five," "two nine," etc., two is frequently taken for four, five for nine, and numerous other faulty combinations of numbers occur.

A new method is founded on the use of letters instead of numbers. For each group of trunks, up to twenty, twenty letters of the alphabet are taken, leaving out A D S T V and Z on account of their sounding similar to other letters. The letters are used to designate the jacks on the outgoing trunk strip as follows:

K

B C E F G H I J K L M N O P Q R U W X Y

Each strip is given a pilot letter, just as K is assigned to this group. The pilot letter, K, would stand for a particular "B" operator's order wire circuit. Every time the "B" operator assigned a trunk, she would use the pilot letter, saying KB, KC, KE, KF, etc. When more than one order circuit is required, each circuit should be given a different pilot letter, as J, W, X, O, all of which are good for pilot use. No two "B" positions in one office could have the same pilot letter, on account of the positions being switched together at night and on Sunday. It is much easier to say two letters than three figures, or even two figures, and takes less time. One can say "KA" quicker than double four, or double four nine. The letters do not take as much room on either the outgoing or incoming strip, as the numbers do. They can be separated, and not run together on the outgoing strip, as numbers do. The pilot letter for each outgoing strip could be painted on the stile strip at the left of the outgoing jack strip, and designated in the same at the incoming end.

On the main frame the trunks would have to retain their numbers in order to keep the records straight. The operating department could keep a duplicate set. This system could be handled in any office trunking to twenty other offices, by using all the letters from B to Y as pilot letters.

Kansas City, Mo. W. B. Bentley.
Traffic Manager Kansas City Home Telephone Co.

Noise on Telephone Lines During Storms.

In TELEPHONY of May 22nd, published under the head of "Leakage from parallel telegraph wires," was a case of trouble that I have had on our lines, and there is no telegraph line near our wire. It always came on in cold weather, when there was a hard wind and snow flurries. I have not been able to fully account for it, but I think that the clicks in the receiver were caused by static current, presumably induced by the wind and snow, arcing across the carbons.

The first time it came on I thought that the "Goblins had got me" sure. The lines were so noisy that they could not be used at all until I tried on one of them a common battery plug, which allowed the current to escape gradually, and that did away with the click. The battery made the lines noisy, but after I cleaned the carbons, which by this time had been burned solid together, on some of the lines, I was able to give fair service.

Later I bridged 1,000-ohm ringers across the lines, and grounded the central point. This made conditions perfectly satisfactory.

Red Wing, Minn. J. M. Green,
Wire Chief, Red Wing Telephone Co.

WANTED—TROUBLE ARTICLES.

Some of the letters about unusual troubles are fine. The editors enjoy reading them, and the managers do, and the wire chiefs start figuring, and the troublemen begin—"Well, that's nothing. Why, when I was out on that line that runs by the old," and so it goes with the unusual troubles.

A NEW THOUGHT.

Let's have a few letters about COMMON troubles. We want you to let us see what is the best way to handle your exchange's business methods, the apparatus you buy. Pick out the trouble that shows up oftenest, tell how it shows, how you can locate it the most quickly and surely; how to repair it, how much it costs; in fact, the whole history.

Pick out any kind of trouble, only let it be your worst one. Never mind whether it's collections, getting your neighbor to settle tolls, driving the motorcycle, or making bells ring—send it in, and be sure and tell how you cure it. If you have any trouble you can't clear, tell us about that—we'll try to show you what's the matter.

Write that letter soon—make it practical, and helpful, and we'll print it, sure—send you a little check, maybe, too.

Address, The Editors of TELEPHONY.

P. S.—THIS CALL BROUGHT IN SOME GOOD LETTERS BEFORE, DON'T YOU THINK SO? LET'S HAVE YOUR LATEST NOW!

The Telephone in the Courts

By A. H. McMillan

Respective Rights of Telephone and Electric Light Companies.

I would like to have your opinion on a case where a light company and a telephone company are operating in the same streets. Say, for instance, the light company had been operating in peaceable possession of the streets without a franchise. The telephone company secures a franchise to operate, and later, by something like two years, the light company secures a franchise also; the telephone company sets poles between the light company's wires before the light company secures its franchise. Later the light company attaches brackets and arms to the telephone company's poles and is liable to cause interference in service, also being dangerous for the telephone employes. Who has the right of way, and can they be made to move their wires so as not to interfere with our operation in any way?

Between electric light companies and telephone companies, the one first rightfully in position is entitled to protection against interference from the lines subsequently erected. For any damages caused by interference, the later established company is liable, and the company injured is entitled to an injunction for its protection. McMillan on Telephone Law, Sec. 139.

Upon the above principles, your company, having a franchise before the electric company, is the one first rightfully in position. You therefore have the right of way and are entitled to protection against the electric light company.

Railroad Rights of Way.

Will you kindly inform me as to my rights in the following matter, through the columns of "Telephony?"

I have constructed a private telephone line on private property (in Maryland) and had to cross the right of way of a railroad company.

I have complied with its specifications as to construction, height, etc., and it now wants me to sign a contract to pay an annual rental of $5, also agreeing to remove my wire on 15 days' notice, and in case I fail to do so, it is to have the right to remove my crossing, rendering me bill.

What are my rights in this matter? The poles are not on their ground and the wire is a single strand of "Okonite."

In this case, the railroad company is probably within its rights in demanding of you an annual rental of $5, and the signing of a contract containing the other provisions you mention. If you were crossing the railroad right of way on a highway, it would be different, but apparently you are crossing at a point where there is no highway. Where there is a highway, the public have a right of way across the railroad track. At other points, they have no such right of way.

Duty of State Corporation Commission.

An appeal was taken from an order of the State Corporation Commission of Oklahoma, prescribing the rates which the Pioneer Telephone and Telegraph Company should be permitted to charge in the city of Enid. The schedule of rates charged by the company was as follows: For business wall telephones, $2.00; for desk telephones, $2.50; residence individual telephones, $1.50; residence, two party line, $1.25; residence four party line, $1.00. On November 1, '07, the company advanced all these rates. A petition was filed with the corporation commission, asking the restoration of the rates to the former schedule. The commission then made an order fixing the rates as follows: For business and office, $2.00; for residence, $1.50; for two party line, $1.00; for three or more party line, 75 cents.

The company appealed from this order on a number of grounds: That the order was not supported by evidence; that the rates prescribed amounted to a confiscation of property, and were unconstitutional. The Supreme Court of the State remanded the matter to the commission with instructions to make an investigation of the evidence, and to make a finding of facts as was their duty to do under Section 22 of Article 9 of the Constitution. (1 Bunn's Ed. Sec. 234) Pioneer Telephone and Telegraph Company vs. Westenhaver, 90 Pac., 1019.

Gross Earnings Tax on Arizona Mutual Company.

In the issue of May 15, 1909 (Volume 17, No. 20, p. 576), a question was answered under the heading of "Gross Earnings Tax on Mutual Company." Each subscriber of the company inquired about was a stockholder, paying a monthly assessment just sufficient to pay operating expenses and depreciation fund. The new tax law of Arizona required a statement to be made by the company of the amount of its gross earnings. The company was advised to answer that it had no earnings. The Editor was of the opinion that the total amount of assessments paid by the subscribers as stockholders, would be held to be gross earnings. This opinion is confirmed by the attitude of the territorial auditor. The company writes:

"The answer made to the auditor was to the effect that we had no earnings, as set forth in query. In his reply he stated that the total amount of assessments paid by stockholders would be the gross earnings, and as such an interpretation of the matter cuts our taxes just about in half, as compared with what we have been paying, we are quite well satisfied. If any new developments arise, we will advise you further."

Injury From Defective Platform.

Among the appliances furnished by a telephone company to its splicer and his assistant was a platform four feet square, with a rope eight feet long from each corner, with which to fasten it to projections from a pole when splicing a cable at any height. The assistant and splicer had been working together about three months, during which time the platform had been in their possession, the splicer having used it for some time previous. While it was being used, one of the ropes parted allowing the men to fall to the ground. The assistant brought suit for his injuries, but judgment was given for the telephone company. The Supreme Court of Wisconsin affirmed this judgment on the ground that the platform was a simple appliance, sufficient when furnished, as shown by its use for so long a time, and that, as the employees knew the extent and frequency of its subsequent use and could observe as no one else could the growth of any defect, and as the employer could get information about it only through them, he was not liable. Isaacson vs. Wisconsin Telephone Company, 119 N. W., 804.

Relief Asked Against Rates of Colorado Telephone Company.

In the Supreme Court of Colorado, a case is pending against the Colorado Telephone Company asking for the continuance of the injunction which was granted by the district court against the company, restraining it from disconnecting its Arvada patrons. The contention on the part of the patrons of the company is summed up as follows:

Where a telephone company has, within limits prescribed by it for furnishing telephone service to the public, established telephone connections and furnished to its said customers, within said limits, an efficient tele-

phone service and facilities at reasonable rates, which service and rates have been maintained and acquiesced in for years, it will not be allowed afterward upon any pretext to change said service by furnishing to its said customers in lieu thereof an inferior telephone service at a quadruple rate to that which it had theretofore charged; and where a telephone company attempts such an injury to any of its customers a court of equity, upon a bill filed. will enjoin it from so doing.

Seven of the plaintiffs asking relief are engaged in business as florists, nurserymen, gardeners and merchants, and involved in the case is the health farm of the Young Men's Christian Association.

A Sympathetic View of Telephone Troubles.

In holding that the rate fixed by the city council of Owensboro, Ky., for the Cumberland Telephone Company, was confiscatory, Judge Evans of the Federal Court made the following statement:

"Contentions over telephone rates come up after large expenditures of money by those who install the system. The greater the number of subscribers, the greater the chance that these contentions will come up, there being a greater variety of people to make complaints, and the more accustomed they become to the use of this modern, but necessary public utility, the more pressing appears to be the demand for cheapness, with some tendency also to forget that those who put up the money and pioneered the venture are entitled at least to a fair return upon the sum invested."

Could Not Collect One Hundred Dollars per Day Penalty.

At Little Rock, Arkansas, the suit of Mrs. Dannaher against the Southwestern Telegraph and Telephone Company was dismissed by the court. The suit was brought to collect a penalty of $100 per day for forty days for the failure of the telephone company to give the plaintiff telephone service. She had a telephone out of order for several days, and deducted the amount from the monthly telephone bill, refusing to pay the balance, and the company removed the instrument. The court held that the state law did not intend that the company should pay for taking a telephone out when there was dispute over an account, but was enacted to prevent it from willfully violating the law. Mrs. Dannaher was held to be entitled to collect any actual damage she had sustained, but no penalty.

Practical Questions and Answers

Inductance of Copper Clad Wire.

Kindly advise what effect a copper clad wire, that is, a steel wire having a non-porous copper coating, has upon voice currents when such a wire is used for toll lines.

It seems to me that a steel wire surrounded by copper will act very much like an impedance coil, the steel of the wire having the same relation to the copper coat as the iron in an impedance coil has to the winding.

The so-called copper-clad steel wire, which consists of a steel wire with an exterior covering of copper welded to the steel, is more economical than pure copper wire for certain classes of circuits. Particularly is this true where mechanical considerations require a larger wire, for strength, than is necessary for the desired electrical efficiency. This applies to drop wires for local distribution and to short-haul toll lines; it may apply also to farmers lines.

Mechanical considerations require a certain minimum tensile strength for a span of given length and given sag, with a specified sleet load per linear foot, specified wind velocity and minimum temperature, taken all in conjunction. The corresponding size of hard drawn copper wire is larger in many cases than the size which is found from a consideration of the electrical design, taking into account

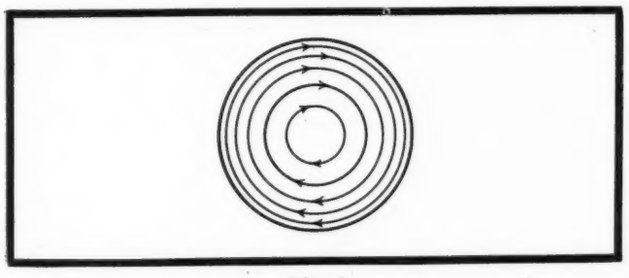


Fig. 1.

in the latter the several transmission losses which are permissible and therefrom determining the smallest size of wire required. Circuits of a few miles in length, for telephone transmission, do not commonly require a wire which is mechanically strong enough to withstand combined sleet, wind and low temperature. A wire no larger, for example, than one weighing 50 or 75 pounds per mile is sometimes required to give the desired efficiency of transmission, but is impracticable for overhead lines because of its low tensile strength.

The purpose of the steel core in the copper-clad wire is to give the desired tensile strength at a lower cost than would be possible with a wire wholly of copper. Steel and iron have several times the resistance of copper, and hence the copper-clad wire has a greater resistance than a copper wire of the same external diameter. The copper-clad wire is therefore less efficient for transmission than a copper wire of the same size.

The inductance of any wire is composed of two elements, —the inductance which arises from the magnetic field within the body of the wire, and the inductance which arises from the magnetic field outside of the wire. The inductance due to the outside field is a large percentage of the total inductance; the percentage is greater for copper wires than for iron wires, because of the susceptibility of iron to magnetism. In comparing two wires of equal diameter, but different composition, the inductance due to the external field is the same for both and may be disregarded. The magnetic field within a wire, assuming a uniform distribution of the current through the cross-section, is greatest at the surface of the wire and diminishes uniformly toward the center of the wire, where it becomes zero. The field within the wire is illustrated by Fig. 1, which refers to a cross-section of a wire carrying a uniformly distributed current, flowing downward, showing the distribution of the magnetic field.

At the frequencies which occur in telephone transmission, approximately from 100 to 2,000 cycles per second, the distribution of current is not uniform, but increases in density toward the surface of the wire, where it is greatest. This occurs because the elements of current flowing in the cross-section do not encounter equal impedance; the element of current at the center of the wire meets the greatest impedance because the inductance to that element is greatest, while an element of current at the surface of the wire meets the least impedance. The reason for this

may better be understood by reference to Fig. 2, which shows the cross-section of a hollow cylindrical conductor; in the hollow space *A* within the wire there will be no magnetic field due to the current flowing in the cross-section. The elements of current flowing in a solid wire

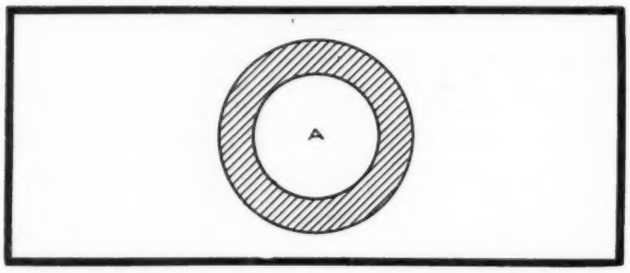


Fig. 2.

encounter the maximum impedance if they are taken at the center of the wire, and the minimum at the surface of the wire.

Therefore alternating currents flowing in a solid wire do not encounter equal impedance at all points in the cross-section. The difference in impedance at the surface and the center becomes appreciable at the high frequencies which occur in telephone transmission and causes the current to be non-uniformly distributed through the section, becoming greatest in density at the surface. This in turn causes an increase in resistance and a slight decrease in the inductance, which has been termed "skin effect."

The practical effect of the iron core is to increase the percentage of total current flowing in the copper, over what would normally flow in the same cross-section of a wire wholly of copper, because of the greater inductance of the iron. There will be no increase of inductance caused by the iron core so far as it affects the current flowing in the copper, because the current in the copper will create no magnetic field whatever in the iron. On the other hand, such portion of the current as flows in the iron (which will be small) will encounter greater inductance than it would in a core of copper of the same size. On the whole we are inclined to the opinion that the inductance of the entire copper-clad wire at high frequencies will not exceed that of a wire wholly of copper and of the same size. A complete investigation would involve mathematical analysis of a complex variety and cannot be given here. There will not be such an effect as that which you imply in your query.

Telephone News

INDEPENDENT TELEPHONE CONVENTIONS

North Dakota, Devils Lake, July 9, 10.

Chicago Council Committee Acts on Tunnel Franchise Proposition.

Last week the committee on Gas, Oil, and Electric Light of the Chicago City Council voted on the proposition to allow the Illinois Tunnel Company to dispose of its telephone rights and property to the Chicago Telephone Company. The committee, instead of recommending such a sale, recommended the extension of the period within which the Tunnel company is required to install 20,000 telephones to June 1, 1911, with a provision that the company should not sell its telephone property or rights to the Chicago Telephone Company before that time, or to any other parties before Dec. 1, 1910, without permission of the city.

This leaves the Tunnel company an opportunity to enter into negotiations with an Independent corporation at any time after Dec. 1, 1910, or before that if the permission of the city can be obtained. During the hearing the suggestion was made by a member of the committee that no public demand for connection with the Independent system had come to the Council from Chicago business men. Mr. Critchfield, of the International Independent Telephone Association, answered this statement sharply, saying:

"The matter of terminal facilities with the long distance lines of the Independent companies will not end with this proposition, unless this proposition should in some way contemplate an ultimate arrangement of that character. By that I mean that, whatever disposition is made of the Tunnel company's franchise, we expect to come back to show Chicago that it is to her advantage to establish these terminals upon a basis that will afford a reasonable return on the money invested in so doing.

"The data which I have submitted to this committee shows absolutely and conclusively that in the larger towns and cities, among the users of telephones for business purposes only, there are more exclusively Independent business telephones than there are Bell, both exclusive and duplicate.

"We have made no effort to influence public sentiment; we have been submitting this to you as a business proposition; and I want to say to you, if this Council requires it for its final conviction, there will be such a demonstration of public sentiment both in Chicago and outside that you will sit up and take notice.

"We have not endeavored to cause that. We have endeavored to submit a clean-cut proposition. We have done it upon the theory that when this committee saw that a majority of all the business telephones within five hundred miles of Chicago have no connection with Chicago, they would not need an affidavit from the users of those telephones that they did desire this communication, but that they would treat those people in the same way that they treat other people who are doing business; they go out after it and get it and do not wait to be invited."

Mr. Walter L. Fisher, representing the City Club of Chicago, made a brief address which is not only valuable for its application to the situation at which it was directly aimed, but because it touches upon the question of public regulation which has been so prominent before legislative bodies in the past two years. He said:

"We are very apprehensive that this committee, perhaps through mere inadvertence, may be led into taking some action which will vitally affect the question of rates in this city. If your committee adopts the policy of permitting a sale to the Chicago Telephone Company it will be because this committee has decided that the principle of regulated monopoly in the telephone business is the correct principle. It can not be justified upon any other theory. If you wish competition in any form you have now available the best possible means for that competition, and the most justifiable means for that competition, for the reason that not only have you another company in

the field, under ordinances providing relatively low rates to the consumer, but that company has abundant capital back of it to carry out any obligations that it may be under. It has invested a considerable amount of money, which it is to its interest to save, and it has issued securities under which, as its representatives have explained to you, it is essential that they shall clear up whatever question there may be as to their obligations to build and carry on the telephone business, particularly in view of certain of their bond issues. Not only that, but you have the situation where the competing company is operating a mechanically different device. You are not in a position where you are simply saying that two manual systems shall enter into competition with each other, or that two automatic systems shall enter into competition with each other, but you are in a position where there is a manual system in competition with an automatic system, so that it would be possible, through competition of that sort, to work out the question as to which of these devices is the better for the public interest; which is in the long run the type of service which will survive. So that, as I say, if you believe that competition has any legitimate place in the telephone business within the city of Chicago, you have here an opportunity to work out that theory such as seldom exists, and which will come as near justifying the principle of competition as it is possible to find. I merely say that for the purpose of coming back to the proposition with which I started, that if this committee decides to permit a sale to the Chicago Telephone Company it must be because this committee will now intelligently and definitely adopt the policy of regulated monopoly.

"Now, if you adopt the policy of regulated monopoly you are then going to be in the power or control of the existing monopoly except in so far as it is intelligently and effectively regulated. The question of regulation becomes absolutely paramount. The minute you create a monopoly within this city in the telephone business or in any other public utility, the question of effective public regulation becomes absolutely controlling."

Mr. Fisher mentioned the present status of the rate-regulating power of the Council, and went on to say, regarding a possible future readjustment of rates:

"You are going to have certain provisions, you are going to have certain accounts presented to you and your accountants and experts presumably are going to advise you as to what would be the proper rate and what can be properly and effectively installed for the different classes of service. Let us suppose that you get an ideal report on that, that you really get information that can be relied upon as being intelligent, accurate, based on scientific and expert knowledge and that shall be fair to both interests, that it shall enable the telephone company to operate its business and pay a proper profit and at the same time enable the people to get proper service at proper rates. The question will immediately arise as to how you are going to enforce those provisions. Suppose a difference of opinion arises between your experts and the experts of the company, or the representatives of the company and this committee, at that time, and the City Council is then of the opinion clearly that certain rates can be properly established which the company insists are too low. Suppose you insist at that time that there are certain methods or provisions with regard to service that should be incorporated and that can practically be carried out, but the telephone company insists that they are unduly onerous and work a hardship upon them, and you get to a place where there is a vital issue. Then the question will immediately arise, what are your powers under the ordinance to enforce your views on that question, and it may well be that the provisions of the ordinance may be found to be not as adequate as you would like to have them and that you will in the meantime, if you have permitted the sale of the Tunnel property, have deprived yourselves entirely of the alternative of going to anybody else and of having anybody else through whom you can deal to meet the situation. You will have created that theory of monopoly without effective regulation which is certainly disadvantageous to the public. Those considerations appear to us to have very great weight indeed.

"If you are going to have the principle of regulated monopoly you should never grant the power to the Chicago Telephone Company to buy the telephone property of the Tunnel company upon terms to be agreed upon between the two companies in which the city of Chicago has no interest or control. The general power to sell from one to the other is a power which you do not know anything about as to its exercise. It may be suggested that the self-interest of the two parties, and particularly the self-interest of the telephone company, may be trusted. Well, now, that may not be at all. Their desire to get rid of competition may be such that they would be willing to pay a price for that purpose that perhaps the city of Chicago would not want them to give, particularly in view of the fact that whatever price they pay ultimately comes back to the consumer under a principle of regulated monopoly. Whatever price they pay they are going to add to their capital account. Whatever may be the price they pay, it is going to be one of the things upon which you must fix rates, upon which a return will be justified. To the extent they pay, to that extent you are going to increase the rates that will be paid to the company."

The Decadence of Bell Property in Indiana.

Analysis of the report just made public by the State Board of Tax Commissioners for Indiana shows that there has been a rapid falling off in the value of Bell telephone property in the State during the fiscal year 1908 and 1909. In round numbers, the board decreased the value of the telephone property in the State by $1,000,000, and of this deduction over $800,000 was made on the property of the Central Union and allied Bell companies. The decrease in the value of the Independent companies was made in the cases of several companies which suffered repeated losses on account of destructive storms.

The property of the Central Union company was assessed at a value lower than that of last year by $600,000, or about one-fifth of the total assessment value of last year.

Of course some of this reduction is due to the company's having disposed of its property and relinquished its local business in certain sections. However, the board apparently did not value this property very highly, since it decreased the value of the United company's property, after it had acquired that of the Central Union, by over $17,000. The property of the Cumberland Telephone & Telegraph Company (Bell) operating in Southern Indiana, was decreased by $226,000, while the Citizens Telephone Company, of Kokomo, a Bell concern, lost $3,352 in value. Thus the total decrease noted for Bell companies in the State was nearly $850,000.

As a contrast with this decrease in Bell values, the Board increased the value of the Indianapolis Telephone Company, and the New Long Distance Telephone Company, two leading Independent companies in the state, by $120,000.

Glenn County Telephone Company Maintains Superiority.

One of the interesting struggles which is going on in the telephone field is that of the Glenn County Telephone Company, of Willows, Cal., against a powerful competitor.

The company is benefited by a recent court decision in actions brought by land holders to prevent the Pacific Telephone & Telegraph Company from erecting its telephone poles along the county roads bordering on the land of these parties. An injunction is granted against the company preventing its erecting poles at such places. The Glenn County company holds a franchise permitting it to erect its poles and lines along the county road. The Pacific company has no such franchise and is, supposedly, acting under the act of Congress passed in 1866 permitting telegraph companies to erect their lines along county roads.

In newspaper reports of the case published locally it is said that the commencement of the suit for an injunction against the erection of poles arose from the fact that the construction the Bell company put up is of such an inferior quality that the land holders claim that the poles and lines will be dangerous and a nuisance.

Decrease in the Taxation Value of Telephone Property.

The report of the Indiana State Board of Tax Commissioners for 1909 has been issued to the public. The report shows a net decrease of values on all properties assessed by the board for the year of $1,734,303, due to the decreased earning power of the various corporations during the financial depression of 1908-1909, and to severe and destructive storms which did great damage to telephone properties.

The properties of the 390 telephone companies reporting to the board showed a total valuation of $10,201,519, and, compared with the valuation of the properties for 1907-1908, there is a decrease of $371,368. The principal decreases were in favor of the Central Union Telephone Company ($610,471), the Cumberland Telephone Company ($276,115) and the Home Telephone Company of Ft. Wayne ($20,480). There were a few other decreases made for minor amounts. On the other hand, increases were made in some other companies as follows: American Telephone & Telegraph Company, $5,873; Indianapolis Telephone Company, $79,517; the New Long-Distance Telephone Company, $28,905.

The Annual Convention of Association of Railway Telegraph Superintendents.

The 28th annual meeting of the Association of Railway Telegraph Superintendents which will be held at Hotel Pontchartrain, Detroit, Michigan, June 23, 24 and 25, promises to be one of the most interesting and profitable meetings ever held. The topic committee, of which Mr. J. L. Davis is chairman, has arranged for the presentation of the following interesting papers:

"The Necessity of Censoring Railroad Telegrams." By J. G. Jennings.

"The Difference between the Trouble Shooter and the Division Lineman." By H. D. Teed.

"The Advantages or Disadvantages of Using Cable in Bringing Wires into Local Stations." By S. L. Van Akin.

"Efficient Office Organization." By E. H. Millington.

"Telephone Construction." By J. C. Kelsey.

"Benefits of Standards in Telegraph and Telephone Construction." By E. J. Little.

"Dry Batteries." By F. H. Loveridge.

"Wireless Telegraph." By Wm. Maver.

"Wire Testing and the Care of Wires." By V. T. Kissinger.

"Pole Preservation." By H. P. Folsom.

Mr. Davis has had advance copies of each of the papers forwarded to two men who are among the best posted members of the association on the topics treated in the paper, and one of these men will start a discussion of the paper and will be followed by the other. In this way it is expected that other members will be induced to take part in the discussions and much interest aroused in each paper. By this plan at least three men will give their opinions on each subject on the program.

There will be quite a few matters of importance brought up before the association, and from present indications the attendance will be unusually large for the reason that every active and associate member is personally interested in the action which is to be taken in regard to these matters.

The manufacturers and dealers in telegraph and telephone aparatus and suplies will have exhibits which will be of great interest to railroad men.

The entertainment committee has not as yet definitely announced its program but it is understood that during the convention sessions, the ladies will be well taken care of with auto rides, a trip up the river to Belle Island and other amusements. An inspection trip to the St. Claire Tunnel at Port Huron is one of the features provided by the entertainment committee, and it is expected that all in attendance at the convention will make this trip.

From the program so far announced for the meeting, it seems a great deal of pleasure will be afforded to the members and their families along with all the benefits derived from the work.

Mr. P. W. Drew and Mr. J. L. Davis will leave Chicago on the morning of June 22 in order to attend an executive meeting in Detroit that evening, and it is expected that a great many others will go at the same time.

Salisbury, Md., Definitely Proposes Independent Company.

On a refusal of the Diamond State Telephone Company, controlled by the Bell company, to restore the old rates to subscribers, after a recent advance for telephone service, arrangements were made to organize a new company. The general counsel of the old company appeared before the City Council, and offered to lease the plant of 700 telephones in Salisbury to local operators, or submit to an investigation of the company's business there, which would show that the company is warranted in raising the rates. A citizens' committee refused both offers, and articles of incorporation were drawn, forming the Citizens Telephone Company with the capital stock set at $30,000. Directors of the company are Alexander M. Jackson, Elmer H. Walton, T. H. Mitchell, Dr. J. M. Toulson and W. C. Cooper.

Talk of Competition with Locally Owned Company at Greencastle, Ind.

The Greencastle Telephone Company, at Greencastle, Indiana, by departing from the traditions of Independent telephony of which it formerly was a firm adherent, has brought trouble upon itself. Not long ago it entered into a service agreement with the Central Union Telephone Company, (Bell) by which it was proposed to, "do away with the evil of dual service." One of the benefits, at least by implication, involved in this proposition was the possibility of an increase in rates for the local company under the monopolistic conditions which would obtain. On June 1st the company announced that the rental for residence telephones had been raised from $1.00 to $1.25 per month. The advance of the rates after the securing of a monopoly, is objected to by its patrons, and talk of discontent with the present condition, and a desire to organize a new company is heard in prominent quarters.

Members of Southern Independent Telephone Association to Meet July 14, at Montezuma, Georgia.

The next meeting of the Southern Independent Telephone Association will be held at Montezuma, Ga., July 14, 1909. It is expected that the attendance will be still larger than at any previous meeting and that matters of much

interest will come up for attention. At the meeting held some weeks ago, the representatives of the Independent companies carried on their principal discussions in executive session, the companies represented being the Moultrie Telephone Company, Douglass Telephone Company, Bainbridge Telephone Company, Brinson Telephone Company, Montezuma Telephone Company, Vidalia Telephone Company, Colquitt Telephone Company, Blakely Telephone Company, Sylvester Telephone and Telegraph Company, McRae-Helena Telephone Company, Bowen Telephone Company and the Ashburn Telephone Company. An invitation to become members of the association was extended to the following companies: Gainesboro Telephone Company, Carrolton, Ga.; Macon County Telephone Company, Ogelthorpe; Cadwell Telephone Company, Cadwell; Central Georgia Telephone Company, Macon; Milledgeville Telephone Company, Milledgeville; Vienna Telephone Company, Vienna; Abbeville Telephone Company, Abbeville, Ga.

Des Moines Mutual Company to Raise Rates.

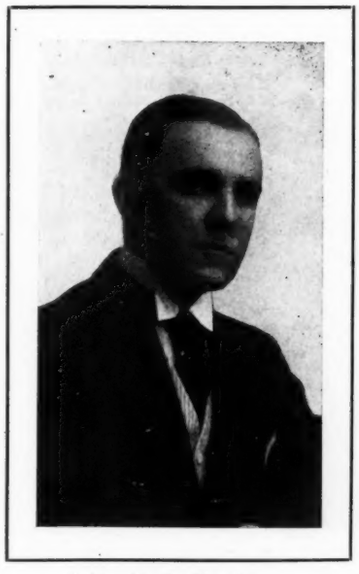
Announcement is made by the Mutual Telephone Company, of Des Moines, Ia., that on July 1 a new schedule of rates will go into effect. Following is a table showing old and new rates, some of the latter giving a discount for prompt payment:

	New.	Net.	Old.
Independent business	$5.00	$4.50	$3.75
Two party business, wall telephone	4.00	3.60	3.00
Two party business, desk telephone	4.00	3.60	3.25
Independent residence, wall telephone	2.75	2.50	2.50
Independent residence, desk telephone	2.75	2.50	2.75
Two party, residence, wall telephone	2.25	2.50	2.75
Two party, residence, desk telephone	2.25	2.25	2.25
Four party, residence, wall telephone	2.25	2.00	2.00
Four party, residence, desk telephone	2.00	2.00	1.75

Marriage of Mr. H. C. Slemin.

On June 9 Mr. H. C. Slemin, sales and advertising manager of the Stromberg-Carlson Telephone Manufacturing Company, was married to Miss Rose Emma Erbe, daughter of Mr. and Mrs. Gustav Erbe, of Rochester, N. Y.

Mr. Slemin receives the congratulations and good wishes for his bride and himself of men from all parts of the country. His vigorous and able conduct of the matters entrusted to him by the Stromberg-Carlson organization has attracted widespread and favorable attention. His efforts have contributed materially to raising the art of telephone salesmanship to a higher plane, and have thus had their due effect upon the material success of the company he represents. His recent promotion to the position of sales manager, while still retaining charge of the advertising department which he developed to such a state of efficiency, was a recognition of merit which received general approval.



Mr. H. C. Slemin.

Mr. and Mrs. Slemin will make their future home in Rochester, where they are well known and prominent in the social affairs of the city.

Technology Elects New President.

On June 7, Richard Cockburn Maclaurin, M. A., LL. D., Sc. D., was inaugurated president of the Massachusetts Institute of Technology at Boston.

The inauguration was attended by alumni from all over the country and some from foreign lands, who had returned to Boston to witness the ceremony and participate in the second All-Technology reunion. Among the prominent men who participated in the ceremonies were: Frederick P. Fish, who acted as Master of Ceremonies; President A. Lawrence Lowell of Harvard University; James Bryce, Ambassador of Great Britain; Governor Draper, and the presidents or professors officially representing over twenty-five of the leading colleges and universities in the country.

Dr. Maclaurin in his inaugural address said:

"The end of education is to fit men to deal with the affairs of life honestly, intelligently and efficiently. That, like many another commonplace in creeds, is one that is almost deliberately ignored in much of common practice. It should be applied thoughtfully and vigorously as a test of every element in the scheme of your educational system. We must try to fit man for life, and for life that is as abundant and complete as possible.

"In the higher education of a large and increasing section of the community science should play a very prominent, if not a leading part. In saying this I am not now thinking of the specialist, to whom science is a necessity of his profession. I am thinking rather of any one who is to take an active and intelligent part in the world of affairs today—whether in business or in public life.

"Science has already profoundly changed the conditions of our life, and it may not be so very long until its method and its spirit permeate our modes of business and of government. It is scarcely necessary to emphasize the claims of science in an institute like this, which devotes so large a share of its attention to the training of men to deal successfully with these great problems of production and distribution which the energy of a great industrial nation makes of paramount importance.

"Today it is common knowledge that these are mainly scientific problems, although half a century ago, when this institute was founded, it was only the far-seeing that had any glimpse of this, and very few among these that had any adequate conception of the mighty change that science would effect in the industrial problems of the world. Where such matters are concerned energy, courage and doggedness are no longer enough, as they once were, to win the fight. Without science they profit nothing, and are no more availing by themselves than is the dauntless courage of the savage in the face of a modern gun."

Injunction Against Merger of Telephone Company at Columbus, Ga., Withdrawn.

Recent reports from Columbus, Ga., announce that George B. Young, a minority stockholder in the Columbus Independent company, who filed injunction proceedings to prevent its sale to the Southern Bell telephone company, has withdrawn his suit, satisfactory settlement of his case having been made.

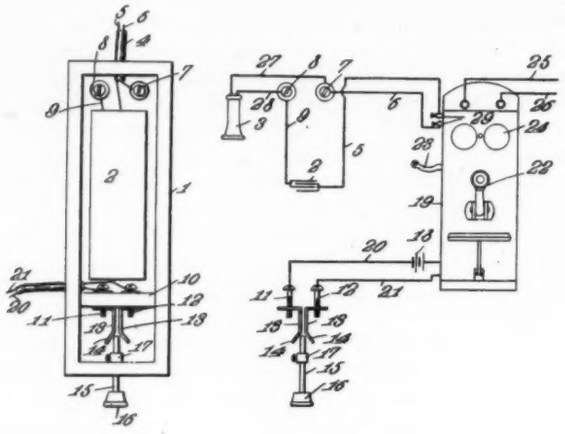
Telephone Patents

Conducted by Max W. Zabel

ATTACHMENT FOR TELEPHONES.

R. E. Pedigo, Chariton, Ia., patent 923,882, June 8, 1909.

This invention is designed to prevent the inability of calling a station on a multi-party line when all the receivers are removed from the switchhook, and to this end,



a condenser, 2, is inserted in the receiver circuit. The patent covers more particularly the specific mounting of the condenser in a box to be mounted on the side of the telephone for that purpose, which box, 1, also has terminals, 13, connected to the talking battery, 18, so that a subscriber may listen in on the line with a receiver, 3, and yet cut out the battery, 18, by means of the connecting bar, 15, when said subscriber does not himself wish to talk over the line.

TRANSMITTER MOUTHPIECE.

M. S. Hufschmidt, San Francisco, and C. F. Wagner, Oakland, Cal., patent 924,072, June 8, 1908.

This mouthpiece is made of porous material, having some of its outer surfaces glazed, but having some of the surfaces which receive the breath of the user unglazed. The whole mouthpiece is impregnated with an antiseptic compound.

TELEPHONE APPLIANCE.

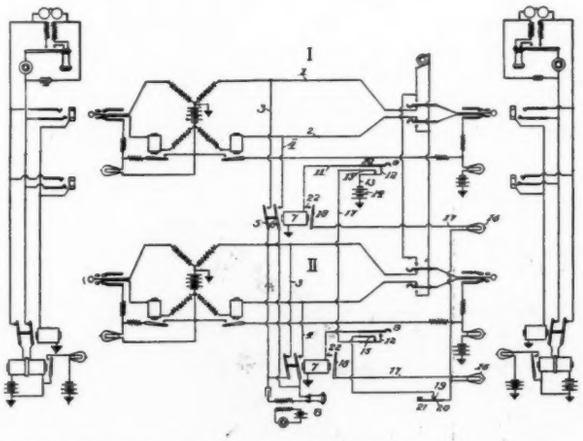
M. P. Flack, New York, N. Y., patent 923,637, June 1, 1909.

A device for preventing the escape of sound from a telephone transmitter so that a person using the instrument may do so without others in the room hearing any part of the conversation is the subject matter of this patent. It comprises a hollow shaped tube of the general style of a truncated cone, which is placed over the transmitter mouthpiece and extends outwardly. Its outer flaring end is provided, on the interior periphery, with a soft rubber interior cushion extending toward the center and partly covering the outer face of the opening, but having space in the center for the mouth and nose, so that the words enter directly into the transmitter and are not dissipated about the room.

TELEPHONE EXCHANGE SYSTEM.

James L. McQuarrie, Oak Park, Ill., patent 923,993, June 8, 1909; assigned to Western Electric Co.

The arrangement of this patent consists in providing an operator's set, 8, which is adapted for association with a plurality of cord circuits, of which two are shown. The cord circuit has a relay, 7, which connects the operator's set to the particular cord circuit desired, by means of the springs, 5 and 6. If an operator wishes to connect her set with the cord circuit, I, she depresses the button, 9, of that cord circuit, and the battery, 14, thereupon energizes the relay, 7, and permanently connects the operator's set, 8, with that particular cord circuit, at the same time displaying a signal, 16, to indicate to the operator with which cord circuit her set is connected. Now, when the operator desires to use another cord circuit, II, for instance, the pressing of the key, 9, of that cord circuit, opens the circuit through the relay, 7, of the cord circuit, I, thus



releasing the connection of the operator's set from that cord circuit, but at the same time connecting to the cord circuit, II, and displaying the signal, 16, of this latter cord circuit. The master key, 21, permits the operator to disconnect her talking circuit from all the cord circuits.

In the Manufacturing Field

A Practical Cord Protector.

A device which will materially reduce the expense for repairing and replacing cords is the new "Banes Telephone Cord Protector," manufactured by Edward T. Banes & Company, Ogontz, Pa. It is the invention of a practical telephone man, who gave it a thorough trial in actual service before ever placing it on the market.

This cord protector is a small specially designed piece of rubber casing or gasket, which is applied, with a liquid cement of high insulating properties, to the end of the cord adjacent to the plug, where deterioration usually takes place most rapidly. Among the advantages claimed for the device are the following:

It absolutely prevents the covering of the cord from

wearing through at this point, thus obviating the nuisance of ragged cords.

It distributes the strain of the retracting weight upon the cord in such a manner as to render breaking of the wires practically impossible.

It forms a cushion for the plug when permitted to fall

Ready to Apply Cord Protector with Special Pliers.

upon the switchboard table, thereby doing away with the annoying sound accompanying this act.

Its insulating properties prevent the cords from becoming "noisy."

It protects the cord lamp caps from becoming broken.

It reduces to a minimum the danger of shock to the operators.

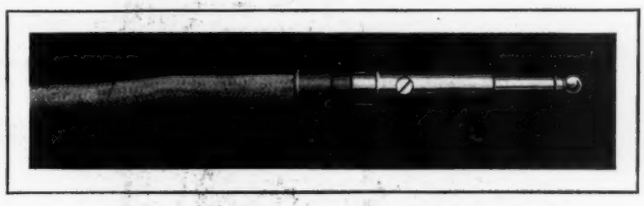
As the device can be attached instantly to any switchboard cord already in use, it is as effective upon old cords as upon those which have not long been subjected to deteriorating influences. The accompanying illustrations clearly show the protector and method of applying it in service.

MIDDLETON BROTHERS, 1361 Monadnock Block, Chicago, have recently been doing some very interesting work in the development of instructions for simple testing methods. The results of their investigations are summarized in some pamphlets containing thoroughly practical points which will particularly appeal to wire chiefs and managers who desire a working acquaintance with the principles of testing which will enable them to perform work with reasonable accuracy, but without complicated figuring and other time wasting methods.

Cord Protector Stretched to Pass Over Plug.

Monarch Engineer Marries.

The officers and office employees of the Monarch Telephone Manufacturing Company have been showing their good will toward the company's engineer, Mr. W. A. Fricke, in various ways upon the occasion of his marriage. The head draftsman put forth his best efforts on the testi-



Rubber Cord Protector in Place Just Behind the Plug.

monial here reproduced, as signed by the heads of the firm and many of the employees. The heart at the left is joined to the matrimonial wire by binding posts built according to the most perfect specifications—the one at the right undoubtedly symbolizes the affections of Miss Bertha Grinnell. The characters which it bears are a tribute to her musical ability and doubtless an augury of domestic harmony.

Mr. Fricke has done valuable work in systematizing the engineering and shop routine of the Monarch company,

HERE'S TO OUR ENGINEER—MAY THE "TWO PARTY SYSTEM" HE HAS JUST PERFECTED ALWAYS BE "HARMONIC" FREE FROM "CROSS TALK" AND HIS CIRCUIT OF HAPPINESS AS COMPLETE AS THE "RING" WHICH MADE THE "SELECTION"
HERE'S TO HIS BRIDE—WE TRANSMIT HER OUR BEST WISHES AND CONGRATULATE HER HUSBAND ON HAVING "HANDLED HIS CALLS" IN A WAY THAT ENABLED HIM TO "SWITCH BOARD" UNDER SUCH PERFECT CONDITIONS

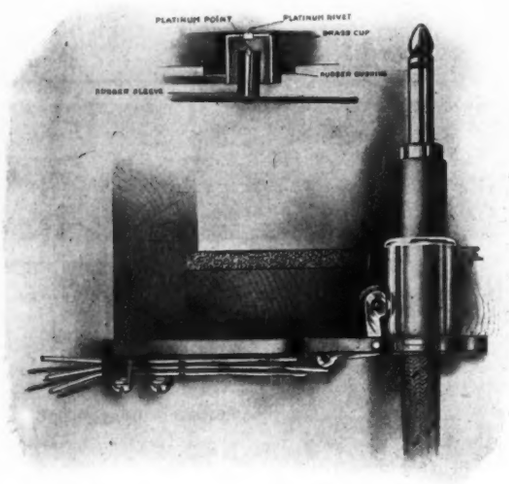
Inspired by the Marriage of W. A. Fricke.

and has made a number of inventions of recognized merit. Men in the operating field with whom he has come in contact, and his business associates, have a high opinion of his ability.

THE DEAN ELECTRIC COMPANY, Elyria, Ohio, has issued a folder under the title of "A Few Things we Make," which tells of the advantages of phantom circuits and gives a diagram of one transposition arrangement for these circuit. The No. 1620 repeating coil, which is said to be most efficient for phantom circuits, is described and illustrated.

A New Transfer Board.

The transfer circuit shown in the accompanying diagram is the one which was installed in the 600-line magneto board built for the Platteville (Wis.) Rewey & Ellenboro Telephone Company by the Monarch Telephone Manufacturing Company. This circuit is one that is used in



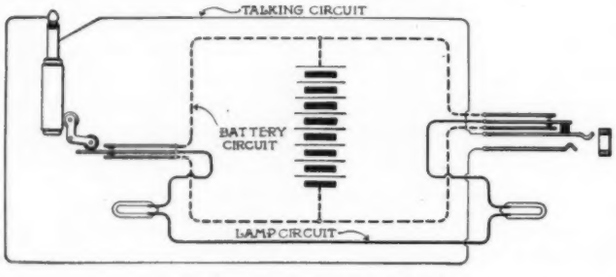
The Monarch Plug Seat Switch.

almost all Monarch transfer boards. There is a decided advantage in having the lamps in series, as it is possible for each operator to know whether or not the lamp at the other position is lighted, as the burning out of one lamp opens the circuit and puts out the other light as well.

The circuit shown is for a plug ended transfer, in which the plug seat switch here illustrated is used. This switch has a contact which is designed to be absolutely dust proof, as the master spring is fitted with a platinum pointed plunger which comes in contact with a platinum disc riveted into the center of an inverted cup. Both contact points are always protected to make it impossible for dust to reach them.

It will be noticed how simple is the mechanical construction of this plug seat switch. Owing to its efficient design and the careful way it is made up the manufacturers say it can be depended upon absolutely.

The Star Expansion Bolt Company, 147 Cedar street, New York City, has, by its skillful advertising campaign, created a large demand for its goods with local dealers



The Monarch Transfer Circuit.

and jobbers. The company has selected the leading journals in various lines of industry, and by its appeal to their subscribers has aided local dealers to build up their business. At the same time the company maintains a stock of its Star expansion shields, screw anchors, drill holders, enameled bridle rings, etc., at its own houses located at 147 Cedar Street, New York City; 142 Lake Street, Chicago, Ill.; 1023 Maison Blanche Bldg., New Orleans, La., and 1010 Howard street, San Francisco Cal.

New Ericsson Salesmen.

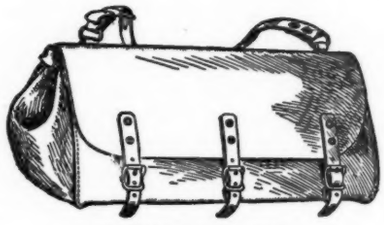
The sales department of the L. M. Ericsson Telephone Manufacturing Company of Buffalo, N. Y., announces the following recent additions to its force.

Mr. C. C. Cassiday, who has been connected with the Corn Belt Telephone Company at Waterloo, Ia., will travel in the states of Iowa and Nebraska. Mr. Cassiday's association with the Corn Belt Telephone Company, which is one of the largest Independent companies in the state, has enabled him to become thoroughly familiar with the telephone situation in Iowa, and he is well known by the exchange managers.

In the Southern States bordering on the coast, Mr. H. S. Bonney, formerly manager of the Culpeper Telephone Company of Culpeper, Va., will represent the Ericsson interests. Mr. Bonney has had a wide experience in the telephone field, having been for a number of years superintendent of construction of the Atlanta Telephone & Telegraph Company of Atlanta, Ga., and later manager of a number of telephone exchanges.

Mr. E. A. Tyler will travel in the states of New York, Pennsylvania and Ohio. Mr. Tyler has recently been with the New York & New Jersey Telephone Company at Jersey City, N. J., and was formerly on the editorial staff of the *American Telephone Journal.*

Mathias Klein & Sons, Chicago, have made a rather valuable contribution to the oft-repeated discussion of the proper style of tool bag, by presenting a practical example in a design which contains the best ideas gained during



The Klein Tool Bag.

many years of experience. Inspectors and trouble men will find that it is not only a convenient shape and size, but very durable. It is provided with extension straps across the ends of the opening so as to allow its being opened out when additional room is required. It has three retaining straps on the flap and loops under the flap for carrying large tools. It is also provided with shoulder straps.

Dean Electric Company Gets Big Order for Branch Exchange Boards.

The Empire Construction Company, installing the large Independent telephone system at San Francisco, Cal., has just placed an order with the Dean Electric Company, Elyria, Ohio, for 60 branch exchange switchboards. The order includes four of the company's standard types.

American Electric Telephone Company, Chicago, announces sales of its No. 45 Burns' express switchboard, in the 150-drop size, for Maple Creek, Sask., Canada; Nepton, Ky.; Markleville, Ind.; Whitesville, Ind.; Osgood, Mo.

The Dayton Telephone Lockout Manufacturing Company recently mailed an attractive postal card offering its hospitality to telephone men who wish to attend the Wright Brothers celebration at Dayton, Ohio, June 17, 1909.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL

MR. F. McKINNEY of Janesville, Wis., has been appointed manager of the Clinton, Wis., telephone exchange.

MR. EBEN J. HOWELLS, formerly chief clerk for the Central Union Telephone Company at Springfield, Ill., has been appointed manager for the company at Jacksonville, Ill.

MR. WILLIAM E. NORRIS, of the Canton, Ohio, exchange of the Central Union Telephone Company, has been promoted to the managership of the Massillon, Ohio, exchange.

MR. CARL THOMAS, of Algoma, Wis., has been appointed manager of the Wisconsin Telephone Company's exchange at Kaukauna, to fill the vacancy left by the resignation of H. H. Albright.

MR. EUGENE CROWLEY has been appointed manager of the Union Telephone Company's exchange at St. Johns, Mich., filling the vacany left by the promotion of C. A. Bloss to the managership of the Owasso exchange.

MR. A. F. METTE, of Pontiac, Ill., has been elected manager of the Automatic Telephone Company of that place. Mr. Mette has been connected with the company since its organization and is at present secretary and treasurer.

MR. C. A. BLOSS, previously manager of the Union Telephone Company's exchange at St. John, Mich., has been promoted to managership of the exchange at Owosso, Mich., to fill the vacancy left by the resignation of H. T. Clough.

MR. H. A. SHEPARD has been appointed Assistant Superintendent of Telegraph of the New York, New Haven and Hartford Railroad Company, with headquarters at New Haven, Conn., to fill the vacancy left by the resignation of W. H. D. Ford.

MR. A. S. HILLHOUSE, of Columbus, Ohio, has accepted the position of general manager of the Austin City Telephone Company, Austin, Texas, Williamson County Telephone Company, Taylor, Texas, and the Bell County Telephone Company, Temple, Texas. Mr. Hillhouse will have his headquarters at Austin.

MR. JOSEPH OGDEN, manager of the Pittston, Pa., branch of the Consolidated Telephone Company has been appointed manager of the company's Wilkes-Barre exchange, to fill the vacancy left by Mr. E. W. McGinnis, who resigned to take up the management of a new telephone company which is erecting a plant in Jackson, Miss.

MR. H. B. STIMSON has recently been appointed general superintendent of traffic of the Rocky Mountain Bell Telephone Company, with headquarters at Salt Lake City, Utah. Mr. Simpson takes this position after extensive experience in the engineering departments of the American Telephone & Telegraph Company, and Northwestern Telephone Exchange Company, and several months' work recently as traveling traffic expert for the A. T. & T. Company.

NEW COMPANIES.

JENKINSBURG, GA.—The Jenkinsburg Telephone Company has been incorporated with $200,000 capital stock. B. F. Aiken, J. F. Tingle and others are the incorporators.

OLIVER, GA.—The Farmers' Telephone Company was recently organized at this place. Material has been ordered and it is expected that work will begin shortly on the local lines. R. D. Farr has been chosen president of the new company; O. H. Marsh, vice-president and H. E. Ezell, secretary and treasurer.

COLUMBIA, ILL.—The Cahokia Telephone Company has been incorporated to operate a telephone system. The company is capitalized at $2,400. H. Reichenbach is one of the interested parties.

NEW HAVEN, ILL.—A new telephone company which will be of great value to citizens of this place has been organized and will be known as the New Haven Toll Company. John Thielman has been chosen president, Ben Bieker, secretary, and C. G. Bocker, treasurer of the new company. The object is to make telephone connections between Carmi and New Haven and it is expected that the line will be in service by the middle of July. The officers are: President, John Thielman; secretary, Ben Bieker; treasurer, C. G. Bocker.

PORT BYRON, ILL.—The Port Byron Telephone Company has been incorporated with a capital of $2,500 to operate in Rock Island county. The incorporators are A. Saddoris, W. H. Groh and Samuel L. Woodburn.

FORT WAYNE, IND.—The Farmers Washington Township Home Telephone Company has filed articles of incorporation with the Secretary of State, with capital stock placed at $10,000. Lines will be operated in Allen county. John Kariger, George E. Stolte, William E. Miner and John S. Oswald are the incorporators.

INDIANAPOLIS, IND.—The Indiana Union Telephone & Telegraph Company is the name of a new company incorporated to operate telephone systems in Benton, Warren, White, Jasper, Newton, Lake, Porter and other counties. The company is capitalized at $100,000 and the incorporators are F. A. DePeyster, C. A. McNaughton and D. P. Williams.

HARDINSBURG, KY.—The Codyville Telephone Company has been incorporated with a capital of $150. Branson M. Elkins, J. W. Tabor, N. H. Adlington, Tsaddie Allen, Alonzo G. Allen, Overton Basham and J. Cody are the directors.

WINNESBORO, LA.—The Winnsboro Telephone Company has been granted articles of incorporation to operate telephone systems in Winnesboro, and throughout the state. The company is capitalized at $25,000. The board of directors chosen to serve the first year are: A. L. Hills, E. D. Selmser and A. A. Marrs, A. L. Hills being president, E. D. Selmser, vice-president, and A. A. Marrs, secretary and treasurer.

ALAMO, MICH.—A new telephone company has been incorporated under the name of the Alamo Mutual Telephone Company. The company will operate in the townships of Alamo, Oshtemo and parts of Allegan and Van Buren counties. The company is capitalized at $1,500 and the directors are E. P. Hackley, B. F. Hollowell, and others will be elected later.

COLDWATER, MICH.—The Coldwater Telephone Company No. 1, of Barryton, has filed articles of incorporation. The first directors of the new company are: Royal St. John, president; P. Cone, secretary; Empson Bone, treasurer; R. Dangerfield, manager; E. D. Delong, T. J. Delong and Francis Bone, all of Crooked Lake, R. F. D. No. 1.

PORT SANILAC, MICH.—The Thumb Telephone Company has been incorporated with a capital stock of $10,000.

MOTLEY, MINN.—The Laurel Telephone Company is being organized to build and operate about ten miles of line in a northerly direction.

PORTSMOUTH, OHIO—The Scioto County Independent Telephone Company has been incorporated by Mark A. Crawford, of this place; G. F. Lauman, of Bear Creek; W. A. McGeorge, of Mt. Joy.; William T. Dever, who lives near Lucasville, and L. Taylor, of Rarden. It is reported that the company will construct a rural system to traverse the entire northwestern part of the county. The capital stock is $5,000.

FLORENCE, OKLA.—The Boone Telephone Company is the name of a new company organized by C. E. McIntosh, A. P. Sparks and T. W. Elliott, and others. The capital stock of the company is placed at $1,000.

WAURIKA, OKLA.—The Beaver Valley Telephone Company is the name of a new company recently incorporated. The capital stock is $224 and the incorporators are H. L. Wilcox, L. B. Ogletree and George Cassidy.

WESTFALL, ORE.—The Westfall Valley Telephone Company has been incorporated by J. D. Fairman, Jay Brenson, Jasper W. Westfall and Charles E. Johnson. The capital stock is placed at $5,000.

LA WARD, TEX.—The Bay Telephone Company has been incorporated with a capital stock of $1,200. N. Mitchell, I. Ward and A. C. Joines are among those interested in the incorporation.

MAGRUDER, VA.—The State Corporation Commission has granted a charter to the Bruxton Telephone Company of this place. The capital stock is placed at $3,000 and the officers are: President, W. L. Schenk, Oak Tree; vice-president, D. A. Powers, Magruder; Secretary-Treasurer, D. S. Harris, Williamburg.

CHARLESTON, W. VA.—The National Telephone Company has been incorporated with a capital stock of $15,000,000. The company is expected to be the means of consolidating the present National Company of Wheeling, the Consolidated of Fairmont and others into one operating organization, under the control of John A. Howard and associates.

LUMSDEN, SASK., CAN.—The Boggey Creek Rural Telephone Company has been incorporated with its headquarters at this place.

FINANCIAL.

CHRISMAN, IND.—The Portage Home Telephone Company has increased it capital stock to $50,000. The purpose of the increase is to obtain funds for the building of additional lines, the improvement and enlargement of the exchange and the installation of new equipment. H. J. Robins is president and E. G. Miller, secretary of this company.

STORM LAKE, IA.—The articles of incorporation of the Northern Telephone Company have been amended to permit of increasing the capital stock to $20,000

FRANCHISES

HOYTVILLE, OHIO.—The Wood County Telephone Company has been granted a franchise to open a telephone exchange at this place.

CONSTRUCTION.

JONESBORO, ARK.—The St. Louis & Southwestern Telephone Company is contemplating the building of a local exchange at Nettleton.

DES MOINES, IA.—The Mutual Telephone Company is planning to spend about $30,000 on improvements to its system this season. A semi-automatic telephone system will be installed.

GRINNELL, IA.—The Interior Telephone Company is now making arrangements for bettering its service. About $20.000 will be expended in improvements this season.

IOWA CITY, IA.—The Johnson County Telephone Company is stringing a new circuit of lines to Cedar Rapids.

BROWNELL, KAN.—The Brownell Central Telephone Company is remodeling and improving its entire system.

WHITE PIGEON, MICH.—The Three Rivers Telephone Company is constructing a line from White Pigeon to Union, Cass county.

AITKIN, MINN.—The Aitken Telephone Company has commenced work on a line to the new town of Cuyuna. Also the company will run its Deerwood line on its own poles, the wires having been placed on the railroad company's poles when the line was first placed in service.

QUEEN CITY, MO.—The Farmers' Telephone Company will make some improvements to its service. A new and up-to-date switchboard has been ordered and will be installed shortly.

MISSOULA, MONT.—J. C. Ball, of the Montana Independent Telephone Company of Butte, reports that 14 cars of material and supplies are enroute for this place to be used in the construction of a local system and a line between Missoula and Bitter Root. The system will be of the automatic type. A temporary switchboard will be placed almost immediately for the use of the business houses and the residents will be taken care of then as quickly as possible.

ROSWELL, NEW MEX.—Stockholders of the Roswell Telephone Company held a meeting recently and made arrangements to have the construction of a new exchange building rushed. The new building will be two stories high built of brick. The building will be modern in every respect.

ATHENS, OHIO.—The Home Telephone Company is installing its new switchboard. Three carloads of material have also arrived for other improvements.

ELLWOOD CITY, PA.—The American Union Telephone Company is planning many improvements to its lines in this city and vicinity. Poles will be replaced and lines reconstructed.

MART, TEX.—Mr. Curlee is contemplating building a long distance line from Grossbeek to connect with the Corsicana Ind. Telephone Company at Corsicana. This will give him an outlet to northern points.

PRESCOTT, WIS.—The Prescott Telephone Company is making extensive improvements to its system. A new switchboard is being installed and several extensions are to be made.

TOMAH, WIS.—The Tomah Electric & Telephone Company have let the contract for the remodeling of the cabling of the city and vicinity.

ALLAN, SASK. CAN.—The village of Allan has taken advantage of the government's offer of assistance in building a telephone system and about 85 miles of wire have been ordered.

FOXWARREN, MAN. CAN.—The council of the rural municipality of Birtle, Manitoba, is having plans prepared for a number of extensions to be built this year. Mr. F. Graham has charge of the matter.

NAPINKA, MAN. CAN.—Work on the Brenda Municipal telephone system has been resumed and will now be rushed to completion.

WOLSELEY, SASK. CAN.—At a meeting of the stockholders of the Ellisboro Rural Telephone Company, it was decided to make a call of 50 per. cent on the stockholders for new constructions. Mr. J. H. Berry of Wolseley is directly interested.

ELECTIONS.

BANGOR, IA.—At the recent annual meeting of the directors of the Bangor Telephone Company, the following officers were elected: H. M. Green, president; C. C. Carson, secretary, and C. R. Whitney, treasurer.

MAIZE, KAN.—The election of officers for the Maize Telephone Company resulted as follows: Wm. Tuell, president; Joshua Rush, vice-president; L. R. Johnson, secretary; Dr. Parker, treasurer and manager.

EDGAR, NEB.—At the annual meeting of the stockholders of the Edgar Telephone Company, H. C. Hart was elected manager and secretary to take the place of C. P. Avery, who resigned on account of poor health.

COLLINS, OHIO.—The newly elected board of directors of the Townend Telephone Company, recently organized by electing A. B. Kittinger, president; John Liles, vice-president; George N. Helling, secretary, and Elias Jarret, treasurer.

FORT JENNINGS, OHIO.—The Mutual Switchboard Telephone Company held its election of officers recently and George Reynolds was chosen president of the company; F. W. Heimkamp, vice-president; Cornelius E. Kortier, secretary and Shelby Harris, treasurer.

ROANOKE, VA.—Stockholders of the Roanoke Bedford Telephone Company met recently and elected directors and officers. The officers are: President, W. E. Wolfenden, Roanoke; R. L. Dearing, Vinton, vice-president and general manager; I. M. Warren, Roanoke, secretary and treasurer.

LADYSMITH, WIS.—Stockholders of the Rusk County Telephone Company met and elected directors as follows: C. B. Goocher and A. J. Laidlow of Ladysmith, E. C. Campbell and S. M. Alvey of Bruce, and B. F. Faast of Conrath. Mr. Goocher was elected president of the company; Mr. Alvey, vice-president and Mr. Laidlow, secretary and treasurer.

NEW HARTFORD, WIS.—The Midway Mutual Farmers' Telephone Company held its annual meeting recently and elected officers as follows: President, Benherd Mormann; treasurer, Klaus H. H. Husmann; secretary, Michael Gallagher.

TORRINGTON, WYO.—Stockholders of the Rawhide Telephone Company met in Torrington and elected the following officers: J. T. Snow, president; E. L. Patrick, vice-president; H. W. Yoder, secretary, and J. T. McDonald, treasurer. The above named with J. B. Carl constitute the board of directors.

MISCELLANEOUS.

CLARKSVILLE, ARK.—The Johnson County Telephone Company has surrendered its charter to the Secretary of State and has given up the business. Mr. W. R. Hunt was president of the company.

GLENWOOD, ARK.—J. H. Howard, of Malvern, has purchased the Glenwood telephone system and is making extensions to the lines.

STERLING, ILL.—The franchise which was being asked of the city of Sterling by the Bell telephone company has not been granted owing to the fact that the telephone company refused to accept the franchise under the terms set forth in the ordinance. It is reported by the mayor that if the company does not make a settlement and still persists in insisting on conditions other than those in the franchise, the authorities will order the poles and wires, etc., from the city.

FORT WAYNE, IND.—The new directory of the Fort Wayne Home Telephone Company will show a gain of about 500 subscribers over the last one issued.

INDIANAPOLIS, IND.—Judge Anderson of the Federal Court recently heard an application for injunction asked by the Receiver of the Seymour Home Telephone Company against the Central Union Telephone Company, the Merchants' Mutual Telephone Company of Seymour and the Brownstown Telephone Company of Brownstown, to prevent the establishment of connection between the Brownstown, the Central Union and the Merchants' Mutual Telephone Companies. The Seymour Home Telephone Company claims an exclusive contract with the Brownstown company and that connection with the other companies would be in violation of that contract and therefore illegal. Judge Anderson refused the injunction on the stated ground that the order as prayed for would discommode the public and that there was, too, a serious question as to the validity of the exclusive contracts between telephone companies.

INDIANAPOLIS, IND.—The Indianapolis Telephone Company has put into effect a new schedule of rates for its 16,000 subscribers. Single line service is now $6.00 per quarter. Two party line service $4.50; single line bnsiness, $13.50 and two party line business servce $9.00 per quarter.

LAWTON, IA.—The property of the Banner Telephone Company, operating a rural telepnone system in Banner township, Woodbury county, has been sold to the Lawton Telephone Company.

ARLINGTON, KAN.—The Arlington Telephone Company, of which W. P. Hayes has been manager and owner since its organization in 1903, is in a very flourishing condition. When the company was organized the initial installation was twenty telephones and since that time the list has increased to over 300.

OTSEGO, MICH.—Suit has been entered against the Citizen's Telephone Company by William C. Willits of Ekford, for $5000. Mr. Willits claims that he was injured severely through carelessness of the company, having come in contact with a guy wire while driving along the road.

BERTHOLD, N. D.—The Northern Telephone Company has purchased the local system and all farm lines of the Berthold Telephone Company.

MT. VERNON, OHIO.—The Mt. Vernon Telephone Company has equipped its trouble men with motorcycles with which to make quick trips to various parts of Knox county where the company has many rural lines. This method was adopted in order to take care of the trouble reports in the least possible time.

FISHERTOWN, PA.—The American Union Telephone Company of Harrisburg, Pa., has leased its Fishertown exchange, with all lines and telephones in this county, to Mr. John Faint, who was formerly division manager for the company at Bedford, Pa. Mr. Faint will make his headquarters at Fishertown and at present is planning many improvements and extensions to the system.

BROOMHILL, MAN., CAN.—The business men of the Municipality of Argyle are considering the installation of an Independent telephone system. Mr. W. Kilkenny is one of those interested.

ST. THOMAS, ONT., CAN.—At a meeting of the Southern Counties Independent Telephone Company, a resolution was passed favoring government ownership of long distance telephone lines as opposed to the Bell company.